PRODUCTION PART APPROVAL PROCESS (PPAP)

Production Part Approval Process (PPAP)
First Edition Issued February, 1993
Second Edition, 1st Printing, February, 1995, 2nd Printing, July, 1995
Third Edition, September, 1999

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The Second Edition, 2nd Printing, July, 1995 edition is obsolete February 1, 2000
unless otherwise specified by your customer

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FOREWORD TO THE THIRD EDITION

The **Production Part Approval Process (PPAP)** Third Edition was issued to incorporate a number of revisions which include:

- Use of "auditable" language and a format consistent with **QS-9000** to support third party auditing;
- A reordering of the **PPAP** requirements aligned with the typical process flow;
- Revision of "Preliminary Process Capability Requirements", now called "Initial Process Studies", to provide for the use of either Cpk or Ppk, depending on the amount and type of data available, consistent with our **Statistical Process Control** reference manual;
- Clarification of when customer notification and/or submission is required;
- The prior **IASG QS-9000 Sanctioned Interpretations** specific to **PPAP**;
- A Truck OEM-Specific Instructions;
- Requirements for bulk material, including a Bulk Material-Specific Appendix;
- Tire Industry-Specific Appendix;
- An enhanced glossary of terms.

The actual changes of the previous **PPAP** text are minimal, and evolutionary. While the additions have increased the size of the document, they provide greater clarification of **PPAP** requirements and allow application of **PPAP** requirements to a broader community of users.

Current training modules sanctioned by DaimlerChrysler, Ford and General Motors have been revised to incorporate these changes.

Acknowledgments are due to the DaimlerChrysler, Ford and GM Supplier Quality Requirements Task Force (Hank Gryn, Dan Reid and Steve Walsh), Michael Schons from DaimlerChrysler, Carol Myers and Rudy Pomper from General Motors, Paul Norkevicius from Ford, Patricia Messenger from the Chemical Manufacturers Association, Joseph Muscedere from the AIAG Truck and Heavy Equipment Group, and Steve Butcher from the Rubber Manufacturers Association.

The **PPAP** Third Edition obsoletes the Second Edition effective February 1, 2000 unless otherwise specified by your customer.

September, 1999

FOREWORD TO THE SECOND EDITION

This document is the second edition of the Chrysler, Ford and General Motors Production Part Approval Process (PPAP) procedure. It represents a refinement of the original PPAP procedure based on input from representatives at each of these companies. In particular, it includes recommendations by the companies' European affiliates that will facilitate implementation of PPAP and QS-9000 in Europe.

The second edition of PPAP, February 1995, does not revise the production parts approval process. A change summary has been provided as Appendix E. Document control requirements mandate that the February, 1993, edition of PPAP is obsolete effective September 1, 1995.

While this procedure is intended to cover all situations normally occurring during the part approval process, there may be questions that arise during implementation. These questions should be directed to your customer's part approval activity. If you are uncertain how to contact the parts approval activity, the buyer in your customer's Purchasing activity can assist you.

As an aid to suppliers in implementing PPAP, all of the forms required by the procedure are available on diskette and permit entry of all necessary data. Diskettes are available from AIAG at (248) 358-3003.

Please note the customer-specific information in Appendices B, C, and D. These appendices clarify each customer's individual requirements.

The PPAP document represents the efforts of the Chrysler, Ford and General Motors subcommittee members, B. Ray Daugherty and Robert Panczyk (Chrysler), Stephen Walsh (Ford), and Timothy O'Brien and Dennis Whitman (General Motors). The subcommittee gratefully acknowledges the contributions of many employees in their respective companies, without whose assistance and continuing support the procedure could not be effectively implemented.

February, 1995

FOREWORD TO THE FIRST EDITION

This Procedure was developed by the Quality and Part Approval staffs at Chrysler, Ford, and General Motors, working under the auspices of the Automotive Division of the American Society for Quality Control (ASQC) and the Automotive Industry Action Group (AIAG).

The ASQC/AIAG Task Force charter is to standardize the reference manuals, procedures, reporting formats, and technical nomenclature used by Chrysler, Ford, and General Motors in their respective supplier quality systems. Accordingly, this Procedure should be used by suppliers in the submission of production parts for approval to any of these companies.

In the past, Chrysler, Ford, and General Motors each had their own procedures for reviewing supplier submissions of production parts for customer approval (initial samples). Differences between these three processes resulted in additional demands on supplier resources. To improve upon this situation, Chrysler, Ford, and General Motors agreed to develop, and, through AIAG, distribute this Procedure. The work group responsible for the Procedure was led by Rad Smith of Ford's Corporate Quality Office.

While this Procedure is intended to cover all situations normally occurring during the sample submission process, there will be questions that arise during this process. These questions should be directed to your customer's part approval activities. If you are uncertain as to how to contact the parts approval activity, the buyer in your customer's Purchasing office can help.

Please note the customer-specific information in Appendices B, C, and D. These appendices clarify each customer's individual requirements.

The Task Force gratefully acknowledges: the leadership and commitment of Vice Presidents Thomas T. Stallkamp at Chrysler, Norman F. Ehlers at Ford, and J. Ignasio Lopez de Arriortua of General Motors; the assistance of the AIAG in the development, production, and distribution of the Procedure; and the guidance of the Task Force principals Russ Jacobs (Chrysler), Steve Walsh (Ford) and Dan Reid (General Motors), Radley Smith and the assistance of the ASQC Automotive Reading Team. This team, led by Tripp Martin (Peterson Spring), reviewed the Manual for technical content and accuracy and made valuable contributions to the form and content. Since the Manual was developed to meet specific needs of the automotive industry, the ASQC voluntary standards process defined by ASQC policies and procedures was not used in its development.

February, 1993

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INTRODUCTION

PURPOSE

Production Part Approval Process (PPAP) defines generic requirements for production part approval, including production and bulk materials (See Glossary). The purpose of **PPAP** is to determine if all customer engineering design record and specification requirements are properly understood by the supplier and that the process has the potential to produce product consistently meeting these requirements during an actual production run at the quoted production rate.

APPLICABILITY

PPAP shall apply to internal and external supplier sites (See Glossary) of bulk materials, production materials, production or service parts. For bulk materials, **PPAP** is not required unless requested by your customer.

A supplier of standard catalogue production or service parts shall comply with **PPAP** unless formally waived by the customer. Tooling shall be maintained for standard catalogue items as long as the items are offered or stated as being available.

NOTE 1: See the customer-specific instructions in Section II for additional information. All questions about **PPAP** should be addressed to the customer product approval activity (See Glossary).

NOTE 2: A customer can formally waive **PPAP** requirements for a supplier. Waivers for applicable items will be documented by the customer.

APPROACH

The word "shall" indicates mandatory requirements. The word "should" indicates a mandatory requirement with some flexibility allowed in compliance methodology.

Paragraphs marked "**NOTE**" are for guidance in understanding or clarifying the associated requirement. The word "should" appearing in a **NOTE** is for guidance only.

The Glossary contains information that should be used for purposes of compliance to **PPAP** requirements.

SECTION I

I. 1 GENERAL

The supplier shall obtain full approval (See I.5.2.1) from the customer product approval activity for:

1. a new part or product (i.e., a specific part, material, or color not previously supplied to the specific customer).

2. correction of a discrepancy on a previously submitted part.

3. product modified by an engineering change to design records, specifications, or materials.

4. any situations required by Section I.3.

NOTE: If there is any question concerning the need for production part approval, contact the responsible customer product approval activity.

I.2 PPAP PROCESS REQUIREMENTS

I.2.1 Significant Production Run

For production parts, product for **PPAP** shall be taken from a significant production run. This production run shall be from one hour to eight hours of production, and with the specific production quantity to total a minimum of 300 **consecutive** parts, unless otherwise specified by the authorized customer quality representative.

This run shall be manufactured at the production site using the tooling, gaging, process, materials, and operators from the production environment. Parts from each unique production process, e.g. duplicate assembly line and/or work cell, each position of a multiple cavity die, mold, tool or pattern, shall be measured and representative parts tested.

For bulk materials: No specific number of "parts" is required. If a sample is required to be submitted, it shall be taken in a manner as to assure that it represents "steady-state" operation of the process.

NOTE: For bulk material, production histories of current products may often be used to estimate the initial process capability or performance of new and similar products. In cases where no production history of a similar bulk material product or technology exists, a containment plan may be put into effect until sufficient production has demonstrated capability or performance.

I.2.2 PPAP Requirements

The supplier shall meet all specified requirements, e.g. design record, specifications, and for bulk material, the Bulk Material Requirements Checklist (see I.2.2.15 and Appendix F). Any results that are outside specification are cause for the supplier not to submit the parts, documentation and/or records. Every effort shall be made to correct the process so that all design record requirements are met. If the supplier is unable to meet any of these requirements, the customer shall be contacted for determination of appropriate corrective action.

Inspection and testing for **PPAP** shall be performed by a qualified laboratory (See **QS-9000, Third Edition**, cl. 4.10.6). Commercial/independent test laboratories used shall be accredited facilities (see **QS-9000, Third Edition**, cl. 4.10.7, and 4.11.2.b.1). When a commercial laboratory is used, the supplier shall submit the test results on the laboratory letterhead, or the normal laboratory report format. The name of the laboratory that performed the tests, and the date (s) of the tests, and the standards used to run the tests shall be indicated. **Blanket statements of conformance are unacceptable for any test results**.

The supplier shall have the applicable items and records (See **QS-9000, Third Edition**, cl. 4.16), listed below, for each part, or family of parts, regardless of the part submission level. These records (I.2.2.1 – 15 and 19 if any) shall be in a **PPAP** part file, or referenced in such file and be readily available. The items below (I.2.2.16 - 18) shall be readily available for customer use in **PPAP**.

The supplier shall obtain prior approval (see **QS-9000, Third Edition**, cl. 4.16) from the customer product approval activity for exceptions or deviations to **PPAP** requirements.

> **NOTE 1:** The supplier may, upon special arrangement, have tests performed by the customer's laboratories.
>
> **NOTE 2:** All I.2.2 items or records may not necessarily apply to every customer part number from every supplier. For example, some parts do not have appearance requirements, and others do not have color requirements. In order to determine with certainty which items must be included, consult the design record, e.g. part print, the relevant Engineering documents or specifications, and your customer responsible part approval activity.

I.2.2.1 Design Records

The supplier shall have all design records for the saleable product, including design records for components or details of the saleable product. Where the design record, e.g. CAD/CAM math data, part drawings, specifications, is in electronic format, e.g. math data, the supplier shall produce a hard copy (e.g. pictorial, geometric dimensioning & tolerancing [GD&T] sheets, drawing) to identify measurements taken.

> **NOTE 1:** For any saleable product, part or component, there will only be one design record, regardless of who has design-responsibility. The design record may reference other documents making them part of the design record.
>
> **NOTE 2:** For bulk materials, the design records may include identification of raw materials, formulations, processing steps and parameters, and final product specifications or acceptance criteria. If dimensional results do not apply, then CAD/CAM requirements are also not applicable.

I.2.2.2 Any authorized Engineering Change documents

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

I.2.2.3 Engineering Approval, when required

Where specified by the design record, the supplier shall have evidence of customer engineering approval.

> **NOTE:** For bulk materials, this requirement is satisfied by a signed 'Engineering Approval' line item on the Bulk Material Requirements Checklist (Appendix F) and/or inclusion on a customer maintained list of approved materials.

I.2.2.4 Design Failure Mode and Effects Analysis (Design FMEA), if the supplier is design responsible. See **Potential Failure Mode and Effects Analysis** reference manual.

The supplier shall have a Design FMEA developed in accordance with, and compliant to, **QS-9000 Third Edition** requirements for parts or materials for which they are design-responsible. For bulk materials, a Design Matrix (See Appendix F)**,** when required by the Bulk Material Requirements Checklist (see I.2.2.15), shall be prepared prior to developing the Design FMEA.

> **NOTE:** For bulk materials, Design FMEA rankings (Severity, Occurrence, Detection) as discussed in Appendix F, may be utilized to provide proper differentiation of risk factors.

I.2.2.5 Process flow diagrams

The supplier shall have a process flow diagram in supplier-specified format that clearly describes the production process steps and sequence, as appropriate and meets the specified customer needs, requirements and expectations (see **Advanced Product Quality Planning and Control Plan** reference manual). For bulk materials, an equivalent to a Process Flow Diagram is a Process Flow Description.

> **NOTE:** Process flow diagrams for 'families' of similar parts are acceptable if the new parts have been reviewed for commonality.

I.2.2.6 Process Failure Mode and Effects Analysis (Process FMEA). See **Potential Failure Mode and Effects Analysis** reference manual.

The supplier shall have a Process FMEA developed in accordance with, and compliant with **QS-9000 Third Edition** requirements.

> **NOTE:** A single Design or Process FMEA may be applied to a process manufacturing a family of similar parts or materials. For bulk materials, see Appendix F for a severity, occurrence, and detection ranking system to provide proper differentiation of risk factors.

I.2.2.7 Dimensional results

The supplier shall provide evidence that dimensional verifications required by the design record and the Control Plan have been completed and results indicate compliance with specified requirements. The supplier shall have dimensional results for each unique manufacturing process, e.g. cells or production lines and all cavities, molds, patterns or dies (see I.2.2.13).

The supplier shall indicate the date of the design record, change level, and any authorized engineering change document not yet incorporated in the design record to which the part was made.

The supplier shall identify one of the parts measured as the master sample (See I.2.2.17).

The supplier shall record the change level, drawing date, supplier name and part number on all auxiliary documents (e.g. supplementary layout results sheets, sketches, tracings, cross sections, CMM inspection point results, geometric dimensioning and tolerance sheets, or other auxiliary drawings used in conjunction with the part drawing). Copies of these auxiliary materials shall accompany the dimensional results according to the Retention/Submission Requirements Table. A tracing shall be included when an optical comparator is necessary for inspection.

NOTE 1: All dimensions (except reference dimensions), characteristics, and specifications as noted on the design record and Control Plan should be listed in a convenient format with the actual results recorded. The Dimensional Results form in Appendix C, or a checked print where the results are legibly written on a part drawing including cross-sections, tracings, or sketches as applicable may be utilized for this purpose.

NOTE 2: Dimensional results typically do not apply to bulk materials.

I.2.2.8 Records of material / performance test results

The supplier shall have records of material and/or performance test results for tests specified on the design record or Control Plan.

I.2.2.8.1 Material Test Results

The supplier shall perform tests for all part(s) and product material(s) when chemical, physical, or metallurgical requirements are specified by the design record or Control Plan.

All tests required by the design record and related specifications should be listed in a convenient format along with the quantity tested and the actual results of each test. Also indicate any authorized engineering change documents that have not yet been incorporated in the design record.

The material test report (See Appendix D) shall indicate the:

- design record change level of the parts tested, and the number, date, and change level of the specifications to which the part was tested;
- date on which the testing took place;
- material subcontractor's name and, when required by your customer, their supplier code number for the material from the customer-approved subcontractor list.

For products with customer-developed material specifications and a customer-approved subcontractor list, the supplier shall procure materials and/or services (e.g. painting, plating, heat-treating) from subcontractors on that list.

I.2.2.8.2 Performance Test Results

The supplier shall perform tests for all part(s) or product material(s) when performance or functional requirements are specified by the design record or Control Plan.

The test report shall indicate:

- the design record change level of the parts tested, the number, date, and change level of the specifications to which the part was tested;
- any authorized engineering change documents that have not yet been incorporated in the design record;
- the date on which the testing took place.

NOTE: Results for all tests required by the design record or related specifications should be listed in an understandable format and include the quantity tested. The Performance Test Results form in Appendix E may be used for this purpose.

I.2.2.9 Initial Process Studies

I.2.2.9.1 General

The level of initial process capability or performance shall be determined to be acceptable prior to submission for all Special Characteristics designated by the customer or supplier.

The supplier shall perform measurement system analysis to understand how measurement error is affecting the study measurements. (See I.2.2.10 and **Measurement Systems Analysis** reference manual)

NOTE 1: The purpose of this requirement is to determine if the production process is likely to produce product that will meet the customer's requirements. The initial process study is focused on variables not attributes data. Assembly errors, test failures, surface defects are examples of "count" time data, which is important to understand, but is not covered in this initial study. To understand the performance of characteristics monitored by attribute data will require more data collected over time.

NOTE 2: The index for estimating process capability or performance will be agreed upon by the customer and supplier. Cpk and Ppk are described below. Other methods more appropriate for certain processes or products may be substituted with prior customer approval.

NOTE 3: Initial process studies are short-term and will not predict the effects of time and variation in people, materials, methods, equipment, measurement systems, and environment. Even for these short-term studies, it is important to collect and analyze the data in the order produced using control charts.

NOTE 4: For those characteristics that can be studied using X-bar and R charts, a short term study should be based on a minimum of 25 subgroups containing at least 100 readings from consecutive parts of the significant production run (See I.2.1). The initial data requirements may be replaced by longer-term results from the same or similar processes, with customer concurrence. For certain processes, alternative analytical tools such as individual and moving range charts may be appropriate and permitted with prior customer approval.

I.2.2.9.2 Quality Indices

Initial process studies should be summarized with capability or performance indices, if applicable.

NOTE 1: The initial process study results are dependent on the purpose of the study, data normality (assumption is normality and two sided specifications), method of data acquisition, sampling, amount of data, demonstration of statistical control, etc. It is assumed that anyone trying to apply the principles listed below has reviewed the capability section in the **Statistical Process Control** reference manual and understands basic principles of stability from an average and range chart perspective. For guidance on items listed below, contact the customer responsible part approval activity. See **Statistical Process Control** reference manual**,** Chapter 2, Section 5, D: Suggested Use of Process Measures.

Cpk- The capability index for a stable process. The estimate of sigma is based on within subgroup variation (R-bar/d2 or S-bar/c4).

Ppk- The performance index. The estimate of sigma is based on total variation (all of individual sample data using the standard deviation [root mean square equation], "s").

Short-term studies. The purpose of the initial process study is to understand the process variation, not just to achieve a specific index value. When historical data is available or enough initial data exist to plot a control chart (at least 100 individual samples), Cpk can be calculated when the process is stable. For

chronically unstable processes with output meeting specifications and a predictable pattern, Ppk should be used. When not enough data is available (<100 samples) contact the customer responsible part approval activity to develop a suitable plan.

Refer to the **Statistical Process Control** reference manual for information on evaluating stability and a detailed description of Ppk and Cpk.

NOTE 2: For bulk material, the supplier should obtain customer agreement regarding the appropriate techniques for initial process studies, if required, in order to determine an effective estimate of capability.

I.2.2.9.3 Acceptance Criteria For Initial Study

The supplier shall use the following as acceptance criteria for evaluating initial process study results for processes that appear stable:

Results	***Interpretation***
Index Value > 1.67	The process currently meets customer requirements. After approval, begin production and follow Control Plan.
1.33 ≥ (Index Value) ≥ 1.67	The process is currently acceptable, but may require some improvement. Contact your customer and review results of the study. This will require changes to the Control Plan, if not improved prior to start of volume production.
Index Value < 1.33	The process does not currently meet the acceptance criteria. Contact the appropriate customer representative for a review of the study results.

NOTE: Cpk can only be used for stable processes.

I.2.2.9.4 Unstable Processes

Depending on the nature of the instability, an unstable process may not meet customer requirements. The supplier shall identify, evaluate and, wherever possible, eliminate special causes of variation prior to **PPAP** submission. The supplier shall notify the customer of any unstable processes that exist and shall submit a corrective action plan to the customer **prior to any submission**.

NOTE: For bulk materials, if historical data shows that similar processes are chronically unstable, and previous actions have been unable to achieve stability, corrective action plans may not be warranted.

I.2.2.9.5 Processes With One-Sided Specifications or Non-Normal Distributions

The supplier shall determine with the customer an alternative acceptance criteria for processes with one-sided specifications or non-normal distributions.

NOTE 1: The above mentioned acceptance criteria (I.2.2.9.3) assumes normality and a two-sided specification (target in the center). When this is not true, using this analysis may result in unreliable information. This alternate acceptance criteria could require a different type of index or some method of transformation of the data. The focus should be on understanding the reasons for the non-normality (e.g. is it stable over time?) and managing variation.

NOTE 2: For bulk materials, non-normal distributions are generally found after routine plotting of histograms of process data. Quality indices should not be computed because the values obtained may be misleading.

I.2.2.9.6 Strategy When Acceptance Criteria Are Not Satisfied

The supplier shall contact the customer if the process cannot be improved.

If acceptance criteria cannot be attained by the **PPAP** submission promise date, the supplier shall submit to the customer for approval a corrective action plan and a modified Control Plan normally providing for 100% inspection (see **QS-9000, Third Edition**, cl. 4.2.3.7). See **QS-9000, Third Edition**, cl. 4.2.5, Continuous Improvement for additional techniques. Continue variation reduction efforts until a Ppk or Cpk of 1.33 or greater is achieved, or until customer full approval is received.

NOTE: For bulk materials, a product that does not meet the capability requirements as defined by the customer may be allowed to go forward into production. For example, if the supplier relies on 100% inspection, using a test method as agreed to by the customer, then approval may be granted. **100% inspection for bulk material means an evaluation of a sample(s) of product from a continuous process or homogeneous batch which is representative of the entire production run**. If historical data show that similar processes do not meet the acceptance criteria, corrective action plans may not be warranted.

I.2.2.10 Measurement System Analysis Studies

The supplier shall have applicable Measurement System Analysis studies, e.g. gage R&R, bias, linearity, stability studies, for all equipment used for new or modified gages, measurement, and test equipment. (See I.2.2.9.1 and **Measurement Systems Analysis** reference manual)

NOTE: For bulk materials, Measurement System Analysis may not apply. Customer agreement on actual requirements should be obtained during the planning phase.

I.2.2.11 Qualified Laboratory Documentation

The supplier shall have a laboratory scope and documentation showing that laboratories used comply with **QS-9000, Third Edition,** cl. 4.10.6 and/or 4.10.7.

I.2.2.12 Control Plan (See **Advance Product Quality Planning and Control Plan** reference manual and **QS-9000, Third Edition**, cl. 4.2.3.7)

The supplier shall have a Control Plan that defines all controls used for process control and complies with **QS-9000** (See **QS-9000, Third Edition** cl. 4.9).

NOTE 1: Control Plans for "families" of similar parts are acceptable if the new parts have been reviewed for commonality.

NOTE 2: Certain customers require Control Plan approval, e.g. customer signature on the Control Plan, prior to submission. See **QS-9000, Third Edition,** Section II, Customer-specific appendices.

I.2.2.13 Part Submission Warrant (PSW)

Upon satisfactory completion of all required measurements and tests, the supplier shall record the required information on the Part Submission Warrant (PSW).

A separate PSW shall be completed for each customer part number unless otherwise agreed to by the customer.

If production parts will be produced from more than one cavity, mold, tool, die, pattern, or production process, e.g. line or cell, the supplier shall complete a dimensional evaluation (see I.2.2.7) on one part from each. The specific cavities, molds, line, etc., shall then be identified in the "Mold/Cavity/Production Process" line on a PSW, or in a PSW attachment.

The supplier shall verify that all of the measurement and test results show conformance with customer requirements and that all required documentation is available (or, for Level 2, 3, and 4, is included in the submission). A responsible supplier official shall approve the PSW and provide date, title, and telephone number.

NOTE 1: One warrant per customer part number can be used to summarize many changes providing that the changes are adequately documented, and the submission is in compliance with customer program timing requirements.

NOTE 2: PSWs may be submitted electronically in compliance with customer requirements, if any.

I.2.2.13.1 Part Weight (Mass)

The supplier shall record the part weight of the part as shipped on the PSW, measured and expressed in kilograms to four significant decimal places (0.0000) unless otherwise specified by the customer. The weight shall not include shipping protectors, assembly aides, or packaging materials. To determine part weight, the supplier shall individually weigh ten randomly selected parts, calculate and report the average weight. At least one part shall be measured from each cavity, tool, line or process to be used in product realization.

NOTE: This weight is used for vehicle weight analysis only and does not affect the approval process. Where there is no production or service requirement for at least ten parts, the supplier should use the required number for calculation of the average part weight. For bulk materials, the part weight field is not applicable.

I.2.2.14 Appearance Approval Report (AAR)

A separate Appearance Approval Report (AAR) shall be completed for each part or series of parts for which a submission is required if the product/part has appearance requirements on the design record.

Upon satisfactory completion of all required criteria, the supplier shall record the required information on the AAR. The completed AAR and representative production products/parts shall be submitted to the location specified by your customer to receive disposition. AARs (complete with part disposition and customer signature) shall then accompany the PSW at the time of final submission based upon the submission level requested. Additional requirements may be recorded in customer-specific requirements.

NOTE 1: AAR typically applies only for parts with color, grain, or surface appearance requirements.

NOTE 2: Certain customers may not require entries in all AAR fields. See Appendix B for detailed instructions on completing the AAR.

I.2.2.15 Bulk Material Requirements Checklist (applies only to bulk material PPAP)

For bulk material, the Bulk Material Requirements Checklist (see Glossary) shall be jointly agreed upon by the customer and supplier. All specified requirements shall be completed unless specifically indicated as "Not Required" (NR) on the checklist.

NOTE: Additional requirements may be specified on the checklist.

I.2.2.16 Sample Production Parts

The supplier shall provide sample product as requested by the customer and as defined by the submission request.

I.2.2.17 Master Sample

The supplier shall retain a master sample for the same period as the production part approval records, or a) until a new master sample is produced for the same customer part number for customer approval, or b) where a master sample is required by the design record, Control Plan or inspection criteria, as a reference or standard to be used. The master sample shall be identified as such, and shall show the customer approval date on the sample. The supplier shall retain a master sample for each position of a multiple cavity die, mold, tool or pattern, or production process unless otherwise specified by the customer.

NOTE 1: When part size, sheer volume of parts, etc. makes storage of a master sample difficult, the sample retention requirements may be modified or waived in writing by the responsible customer product approval activity. The purpose of the master sample is to assist in defining the production standard, especially where data is ambiguous or in insufficient detail to fully replicate the part to its original approved state.

NOTE 2: Many bulk material properties are by their nature time dependent, and if a master sample is required, it may consist of the manufacturing record, test results, and certificate of analysis of key ingredients, for the approved submission sample. (see Appendix F).

I.2.2.18 Checking Aids

If requested by the customer, the supplier shall submit with the **PPAP** submission any part-specific assembly or component checking aid.

The supplier shall certify that all aspects of the checking aid agree with part dimensional requirements. The supplier shall document all released engineering design changes that have been incorporated in the checking aid at the time of submission. The supplier shall provide for preventive maintenance of any checking aids for the life of the part (see Glossary - "Active Part").

Measurement system analysis studies, e.g. gage R & R, accuracy, bias, linearity, stability studies, shall be conducted in compliance with customer requirements. (See I.2.2.10 and **Measurement Systems Analysis** reference manual).

NOTE: Checking aids can include fixtures, gages, models, templates, mylars specific to the product being submitted. Checking aids, etc. typically do not apply to Bulk Materials.

I.2.2.19 Customer-Specific Requirements

The supplier shall have records of compliance to all applicable customer specific requirements. (See Section II). For bulk materials, any customer-specific requirements shall be documented on the Bulk Material Requirements Checklist.

I.3 CUSTOMER NOTIFICATION AND SUBMISSION REQUIREMENTS

I.3.1 Customer Notification

The supplier shall notify the responsible customer product approval activity of any design and process changes as indicated in the table below. The customer may subsequently elect to require a submission for **PPAP** approval. (see Table I.3.1)

Table I.3.1

Requirement	Clarification or examples
1. Use of other construction or material than was used in the previously approved part or product.	For example, other construction as documented on a deviation (permit) or included as a note on the design record and not covered by an engineering change as described in Table I.3.2 #3.
2. Production from new or modified tools (except perishable tools), dies, molds, patterns, etc., including additional or replacement tooling.	This requirement only applies to tools which due to their unique form or function, can be expected to influence the integrity of the final product. It is not meant to describe standard tools (new or repaired), such as standard measuring devices, drivers (manual or power), etc.
3. Production following refurbishment or rearrangement of existing tooling or equipment.	Refurbishment means the reconstruction and/or modification of a tool or machine or to increase the capacity, performance, or change its existing function. This is not meant to be confused with normal maintenance, repair or replacement of parts, etc., for which no change in performance is to be expected and post repair verification methods have been established. Rearrangement is defined as activity which changes the sequence of product/process flow from that documented in the process flow diagram (including the addition of a new process). Minor adjustments of production equipment may be required to meet safety requirements such as, installation of protective covers, elimination of potential ESD risks, etc. These changes can be made without customer approval unless the process flow is changed as a result of this adjustment.
4. Production from tooling and equipment transferred to a different plant location or from an additional plant location.	Production process tooling and/or equipment transferred between buildings or facilities in one or more locations.
5. Change of subcontractor for parts, non-equivalent materials, or services (e.g.: heat-treating, plating) that affect customer fit, form, function, durability, or performance requirements.	Suppliers are responsible for approval of subcontracted material and services that do not affect customer fit, form, function, durability, or performance requirements.

Requirement	Clarification or examples
6. Product produced after the tooling has been inactive for volume production for twelve months or more.	For product that has been produced after tooling has been inactive for twelve months or more: Notification is required when the part has had no active purchase order and the existing tooling has been inactive for volume production for twelve months or more. The only exception is when the part has low volume, e.g. service or specialty vehicles. However, a customer may specify certain PPAP requirements for service parts.
7. Product and process changes related to components of the production product manufactured internally or manufactured by subcontractors that impact fit, form, function, performance, and/or durability of the salable product. Additionally, the supplier shall concur with any requests by a subcontractor before submission to the customer.	Any change that affects customer requirements for fit, form, function, performance, and/or durability requires notification to the customer. **NOTE:** The fit, form, function, performance, and/or durability requirements should be part of customer specifications as agreed on during contract review.
8. For bulk materials only: New source of raw material with special characteristics from new or existing subcontractor. Change in product appearance attributes where there is no appearance specification. Revised parameters in the same process (outside PFMEA parameters of the approved product, includes packaging). Change outside of DFMEA (product composition, ingredient levels) of the approved product.	These changes would normally be expected to have an effect on the performance of the product.
9. Change in test/inspection method – new technique (no effect on acceptance criteria)	For change in test method, supplier should have evidence that the new method provides results equivalent to the old method.

I.3.2 Submission to Customer

The supplier shall submit for **PPAP** approval prior to the first production shipment in the following situations unless the responsible product approval activity has waived this requirement (see Table I.3.2).

The supplier shall review and update, as necessary, all applicable items in the **PPAP** file to reflect the production process, regardless of whether or not the customer requests a formal submission. The **PPAP** file shall contain the name of the responsible customer product approval activity person granting the waiver and the date.

Table I.3.2

Requirement	Clarification or examples
1. A new part or product (i.e. a specific part, material, or color not previously supplied to the specific customer.)	Submission is required for a new product (initial release) or a previously approved product which has a new or revised (e.g. suffix) product/part number assigned to it. A new part/product or material added to a family may use appropriate **PPAP** documentation from a previously fully approved part within the same product family.
2. Correction of a discrepancy on a previously submitted part.	Submission is required to correct any discrepancies on previously submitted part. A "discrepancy" can be related to: • The product performance against the customer requirement • Dimensional or capability issues • Subcontractor issues • Full Approval of a part replacing an interim approval • Testing, including material, performance, engineering validation issues
3. Engineering change to design records, specifications, or materials for production product/ part number(s).	Submission is required on any engineering change to production product/part design records, specifications or materials.
4. For Bulk Materials only: Process technology new to the supplier, not previously used for this product.	

I.3.3 Situations Where Customer Notification Is Not Required

Customer notification and submission (e.g. PSW) is not required for the situations described in the below table. The supplier is responsible to track the changes and/or improvements and update any affected **PPAP** documentation. The following examples are of manufacturing and quality systems situations and/or improvements.

> **NOTE:** Customer notification is required any time customer product requirements for fit, form, function, durability and performance are affected.

Table I.3.3

Requirement	Clarification or examples
1. Changes to component level drawings, manufactured internally or manufactured by sub-contractors, that do not impact the design record for the product supplied to the customer.	Changes do not affect customer fit, form, function, durability or performance requirements.
2. Tool movement within the same plant (used in equivalent equipment, no change in process flow, no disassembly of the tool) or equipment movement within the same plant (same equipment, no change in process flow).	Based on lean manufacturing initiatives, some equipment is designed for mobility, i.e. on wheels with quick disconnects. Cell configurations or location within a department may be changed without affecting process flow. No change made to process flow or control plan.
3. Changes in equipment (same process flow with same basic technology or methodology).	Examples are new equipment, additional equipment, replacement, or change in equipment size.
4. Identical gage replacement.	Gages replaced as a part of a gage maintenance or calibration system.
5. Rebalance of operator job content with no change in process flow.	Lean manufacturing allows for rebalancing job content to eliminate bottleneck issues.
6. Changes resulting in reduced RPN on PFMEA (with no change to process flow).	Examples include added controls, increased sample size and frequency, and error-proofing installation.
7. For Bulk Materials only: Changes within the DFMEA (formulation range, packaging design) of the approved product. Changes within PFMEA (process parameters). Changes which do not significantly affect a Special Characteristic (including shift in target point within approved specification limits). Changes in approved commodity ingredient (no change in Chemical Abstract Service [CAS] number within CAS family) and/or change in approved subcontractors. Change in subcontractor producing location of a raw material that has no Special Characteristics. New source of raw material that has no Special Characteristics. Tightening of Customer/Sales acceptance tolerance limits.	These changes are within the product/process parameters previously defined and/or approved. Tracking by supplier is sufficient to assure continuous product performance in the defined application.

I.4 SUBMISSION TO CUSTOMER - LEVELS OF EVIDENCE

I.4.1 Submission Levels

The supplier shall submit the items and/or records specified by the level as requested by the customer:

Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to the customer.

Level 2 - Warrant with product samples and limited supporting data submitted to the customer.

Level 3 - Warrant with product samples and complete supporting data submitted to the customer.

Level 4 - Warrant and other requirements as defined by the customer.

Level 5 - Warrant with product samples and complete supporting data available for review at the supplier's manufacturing location.

See Retention/Submission Requirements Table I.4.1 for exact requirements for each level.

The supplier shall use level 3 as the default level for all submissions unless specified otherwise by the responsible customer product approval activity. A supplier of bulk material only shall use level 1 as the default level for all bulk material **PPAP** submissions unless specified otherwise by the responsible customer product approval activity.

> **NOTE 1:** The customer will identify the submission level that will be used with each supplier, or supplier and customer part number combination. Different customer locations may assign different submission levels to the same supplier manufacturing location.
>
> **NOTE 2:** All of the forms referenced in this document may be replaced by computer-generated facsimiles. Acceptability of these facsimiles is to be confirmed with the responsible part approval activity prior to the first submission. The Automotive Industry Action Group (AIAG) offers for sale a diskette with the **PPAP/APQP/FMEA** forms.

Retention/Submission Requirements Table I.4.1
(Normative - See I.2.2 Note 2)

		Submission Level				
Requirement		***Level 1***	***Level 2***	***Level 3***	***Level 4***	***Level 5***
1.	Design Records of Saleable Product	R	S	S	*	R
	- for proprietary components /details	R	R	R	*	R
	- for all other components/details	R	S	S	*	R
2.	Engineering Change Documents, if any	R	S	S	*	R
3.	Customer Engineering approval, if required	R	R	S	*	R
4.	Design FMEA (See I.2.2.4)	R	R	S	*	R
5.	Process Flow Diagrams	R	R	S	*	R
6.	Process FMEA	R	R	S	*	R
7.	Dimensional Results	R	S	S	*	R
8.	Material, Performance Test Results	R	S	S	*	R
9.	Initial Process Study	R	R	S	*	R
10.	Measurement System Analysis Studies	R	R	S	*	R
11.	Qualified Laboratory Documentation	R	S	S	*	R
12.	Control Plan	R	R	S	*	R
13.	Part Submission Warrant (PSW)	S	S	S	S	R
14.	Appearance Approval Report, (AAR) if applicable	S	S	S	*	R
15.	Bulk Material Requirements Checklist (for bulk material PPAP only)	R	R	R	*	R
16.	Sample Product	R	S	S	*	R
17.	Master Sample (See I.2.2.17)	R	R	R	*	R
18.	Checking Aids	R	R	R	*	R
19.	Records of Compliance With Customer-Specific Requirements	R	R	S	*	R

S = The supplier shall submit to designated customer product approval activity and retain a copy of records or documentation items at appropriate locations, including manufacturing.

R = The supplier shall retain at appropriate locations, including manufacturing, and make **readily** available to the customer representative upon request.

* = The supplier shall retain at appropriate locations, and submit to customer upon request.

I.5 PART SUBMISSION STATUS

I.5.1 General

The supplier shall be notified by the customer of the disposition of the submission. After production part approval, suppliers shall assure that future production continues to meet all customer requirements.

> **NOTE:** For those suppliers that have been classified as "self certifying" by a specific customer, submission of the required documentation showing supplier approval will be considered as customer approval unless the supplier is advised otherwise.

I.5.2 Customer PPAP Status

I.5.2.1 **Full Approval** indicates that the part or material meets all customer specifications and requirements. The supplier is therefore authorized to ship production quantities of the product subject to releases from the customer scheduling activity.

I.5.2.2 **Interim Approval** permits shipment of material for production requirements on a limited time or piece quantity basis. Interim Approval will only be granted when the supplier has:

- clearly defined the root cause of the non-conformities preventing production approval; and,
- prepared an interim approval action plan agreed upon by the customer. Re-submission to obtain "full approval" is required.

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 is granted.

For bulk materials, the supplier shall use the "Bulk Material Interim Approval" form, or its equivalent (See Appendix F).

I.5.2.3 **Rejected** means that the submission, the production lot from which it was taken, and accompanying documentation do not meet customer requirements. Corrected product and documentation shall be submitted and approved before production quantities may be shipped.

I.6 RECORD RETENTION

Production part approval records (see I.2.2), regardless of submission level, shall be maintained for the length of time that the part is active (See Glossary) plus one calendar year.

The supplier shall ensure that the appropriate **PPAP** records from a superseded part **PPAP** file are included, or referenced in the new part **PPAP** file.

> **NOTE:** An example of an appropriate document/record that should be carried forward from the old file to the new part file would be a material certification from a raw material supplier for a new part that represents only a dimensional change from the old part number. This should be identified by conducting a **PPAP** "gap analysis" between the old and new part numbers.

SECTION II

II.1 DaimlerChrysler Corporation-Specific Instructions

Unless superseded by specific written direction from the DaimlerChrysler Corporation Procurement and Supply representative or by engineering drawing and specification requirements the following instructions apply.

II.1.1 SUBMISSION LEVELS

Suppliers designated by DaimlerChrysler Corporation as "self-certified" are to follow the guidelines for Submission Level 1. All others are to follow the guidelines for Submission Level 2 unless otherwise instructed by your Component Procurement and Supplier Quality representative. When conducting a bulk material PPAP, use conventions as detailed in Section I in this manual.

II.1.2 SUBMISSION

All suppliers submitting their PSW's for **PRODUCTION PARTS** designated for use at all DaimlerChrysler Corporation facilities must follow the directions as found on the DaimlerChrysler Corporation Supply Partner Information Network, (SPIN), on the World Wide Web. This information can be accessed from the PRISM Home Page. Click on PPAP Business Processes.

- All suppliers providing material for any DaimlerChrysler **PILOT** build must submit a PSW utilizing the directions found in the DaimlerChrysler Corporation Supply Partner Information Network, (SPIN), on the World Wide Web. This information can be accessed from the PRISM Home Page. Click on PPAP Business Processes.
- Suppliers must submit their PSW's per table I.3.1 in this manual as required by DaimlerChrysler's "Forever Requirements" as well as PSW's for new and modified parts.

II.1.3 CHECKING AIDS

Checking aids must be submitted when required to perform the dimensional inspection of the part being submitted. Contact your DaimlerChrysler Corporation part approval representative to determine if this requirement can be waived.

II.1.4 APPEARANCE APPROVAL REQUIREMENTS

The supplier must complete the Appearance Approval Report if the design records include any appearance features (e.g.. Color, Grain, Finish, Appearance Standards, or Mastering Standards). Prior to submission with the Warrant, the supplier must obtain a DaimlerChrysler Corporation Design Office approval signature on the Appearance Approval Report.

NOTE: Both Interior and Exterior parts are included in the Appearance Approval Report procedure.

Suppliers of external sheet metal body panels must follow DaimlerChrysler Corporate Procedure 90-57 for surface appearance review.

COMPLETION OF THE APPEARANCE APPROVAL REPORT

1) **End Item Number:** Engineering released part number and engineering change level.
2) **Supplier Name:** Enter component and end item suppler.
3) **Manufacturing Location:** Location where part was manufactured or assembled.
4) **Date:** Date of submission.
5) **Component Part Number:** Engineering released component part number.
6) **Supplier Contact:** Supplier representative responsible for submission.
7) **Supplier Phone Number:** Supplier contact phone number.
8) **Application (Vehicle):** List model year(s) and vehicles in which part is used.
9) **Component Name:** Enter the component part name.
10) **Supplier Code:** DaimlerChrysler assigned code for supplier location where the part was manufactured or assembled.
11) **Buyer Code:** Enter the code for specific buyer of end item.
12) **Customer Engineer:** Enter the name of the DaimlerChrysler Release Engineer responsible for the part being submitted.
13) **Texture ID:** Enter DaimlerChrysler identification number of texture (when applicable).
14) **Texture Source:** Enter name and location of texturing source (when applicable).
15) **Texture Location on Part:** Enter area(s) of grain(s) delineation (when applicable).
16) **Surface and Texture Evaluation (when applicable):**
    a) DaimlerChrysler Design Office manager (or designated representative) approval of pre-textured surface.
    b) DaimlerChrysler Release / Product Engineer authorization to proceed with texture.
    c) DaimlerChrysler Design Office mastering studios designated representative authorization to proceed, including a signed part.
    d) DaimlerChrysler Design Office mastering studios designated representative post texture approval
    Note: Texturing can not proceed without authorized signatures in 16a, 16b, and 16c.
    e) DaimlerChrysler Design Office manager (or designated rep.) decision as to ornamentation and graphics approval requirements.
17) **Base or Raw Material DaimlerChrysler Spec. # and Supplier / Supplier # / Lot # :** Enter DaimlerChrysler material specification code, supplier name, supplier product code, and lot number of the material used to make the submitted part.
18) **Paint or Colorant DaimlerChrysler Spec. # and Supplier / Supplier # / Lot # :** Enter DaimlerChrysler Paint or Colorant Spec. #, supplier name, supplier product code, and lot number of the material used to make the submitted part.
19) **Master # and Color:** Enter full master identification and color number as released by DaimlerChrysler. (Refer to Trim Release).
20) **Ref. Master Type and Date:** Enter reference master type and date as supplied by DaimlerChrysler for visual direction.
21) **Tristimulus and Gloss Part Data: List** numerical (colorimeter) data of submission part as compared to the customer-authorized master. Enter gloss data using 60-degree geometry measuring equipment.
22) **Customer Comments / Approval Status / Initials / Date:** Customer comments regarding color and gloss disposition and/or color direction. Customer will indicate whether the color and gloss are accepted (A) or rejected (R), initial and date the form. Note: Final approval signature is still required.
23) **Supplier Signature, Phone Number & Date:** Supplier designated representative accountable for the certification that the submitted parts and document information is accurate and meets all the requirements specified.
24) **Type of Ornamentation, Graphics Required and Surface Tactility:** Name / process type – cluster graphics, badges, labels, etc. / pad transfer, hot stamp, lithograph, heat transfer, silk screen, laser etch, soft touch feel, etc.
25) **Customer Approval Signature & Date:** Design Office designated rep. Approval of identified ornamentation, graphics and surface tactility.
26) **Comments:** General comments of importance to be initialed and dated.
27) **Customer Interim Approval Signature:** DaimlerChrysler Design Office Interim approval of end item or component part. Allows IAA usage at this submission level.
28) **Customer Final Approval Signature:** DaimlerChrysler Design Office Final approval of end item or component part.

ALL SIGNATURES AND DATES (areas 16 (if applicable), 22, 25 (if applicable) & 27)
MUST BE COMPLETED FOR FULL AAR APPROVAL.

THE AREAS INSIDE THE BOLD LINES ARE FOR CUSTOMER USE ONLY

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APPEARANCE APPROVAL REPORT

END ITEM NUMBER (1)		E/C LEVEL		SUPPLIER NAME (2)		MANUFACTURING LOCATION (3)	DATE (4)
COMPONENT PART NUMBER (5)		E/C LEVEL		SUPPLIER CONTACT (6)		SUPPLIER PHONE (7)	APPLICATION (VEHICLE) (8)
COMPONENT NAME (9)				SUPPLIER CODE (10)		BUYER CODE (11)	CUSTOMER ENGINEER (12)

SURFACE AND TEXTURE EVALUATION

TEXTURE ID (13)	TEXTURE SOURCE (14)	TEXTURE LOCATION ON PART (15)

APPROVALS (16)	CUSTOMER REPRESENTATIVE SIGNATURE AND DATE
DESIGN STUDIO PRE-TEXTURE SURFACE	(a.)
ENGINEERING PRE-TEXTURE CONCURRENCE	(b.)
MASTERING STUDIO TEXTURE ORIENTATION	(c.)
MASTERING STUDIO POST TEXTURE	(d.)
ORNAMENTATION AND GRAPHICS	NOT REQ'D ☐ REQ'D ☐ (e.)

BASE OR RAW MATERIAL DAIMLERCHRYSLER SPEC. # AND SUPPLIER / SUPPLIER # / LOT # (17)

MATERIAL, COLOR, AND GLOSS EVALUATION

PAINT OR COLORANT DAIMLERCHRYSLER SPEC. # AND SUPPLIER / SUPPLIER # / LOT # (18)

MASTER (19)		REF. MASTER (20)		TRISTIMULUS & GLOSS PART DATA (21)					
#	COLOR	TYPE	DATE	DL*	Da*	Db*	De*	CMC	GLS

CUSTOMER COMMENTS (22)	APPROVAL STATUS A	APPROVAL STATUS R	CUSTOMER INITIALS / DATE

SUPPLIER APPROVAL SIGNATURE (23) | PHONE | DATE

ORNAMENTATION, GRAPHICS AND SURFACE TACTILITY

TYPE OF ORNAMENTATION AND GRAPHICS REQUIRED (24) | CUSTOMER APPROVAL SIGNATURE (25) | DATE

COMMENTS: (26)

CUSTOMER INTERIM APPROVAL SIGNATURE (27) | DATE

CUSTOMER FINAL APPROVAL SIGNATURE (28) | DATE

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APPEARANCE APPROVAL REPORT

END ITEM NUMBER	E/C LEVEL	SUPPLIER NAME	MANUFACTURING LOCATION	DATE
COMPONENT PART NUMBER	E/C LEVEL	SUPPLIER CONTACT	SUPPLIER PHONE	APPLICATION (VEHICLE)
COMPONENT NAME		SUPPLIER CODE	BUYER CODE	CUSTOMER ENGINEER

SURFACE AND TEXTURE EVALUATION

TEXTURE ID	TEXTURE SOURCE	TEXTURE LOCATION ON PART

APPROVALS	CUSTOMER REPRESENTATIVE SIGNATURE AND DATE
DESIGN STUDIO PRE-TEXTURE SURFACE	
ENGINEERING PRE-TEXTURE CONCURRENCE	
MASTERING STUDIO TEXTURE ORIENTATION	
MASTERING STUDIO POST TEXTURE	
ORNAMENTATION AND GRAPHICS	NOT REQ'D ☐ REQ'D ☐

BASE OR RAW MATERIAL DAIMLERCHRYSLER SPEC. # AND SUPPLIER / SUPPLIER # / LOT #

MATERIAL, COLOR, AND GLOSS EVALUATION

PAINT OR COLORANT DAIMLERCHRYSLER SPEC. # AND SUPPLIER / SUPPLIER # / LOT #

MASTER		REF. MASTER		TRISTIMULUS & GLOSS PART DATA						CUSTOMER COMMENTS	APPROVAL STATUS		CUSTOMER INITIALS / DATE
#	COLOR	TYPE	DATE	DL*	Da*	Db*	De*	CMC	GLS		A	R	

SUPPLIER APPROVAL SIGNATURE	PHONE	DATE

ORNAMENTATION, GRAPHICS AND SURFACE TACTILITY

TYPE OF ORNAMENTATION AND GRAPHICS REQUIRED	CUSTOMER APPROVAL SIGNATURE	DATE

COMMENTS:

CUSTOMER INTERIM APPROVAL SIGNATURE	DATE

CUSTOMER FINAL APPROVAL SIGNATURE	DATE

BOLD BOXED AREAS FOR CUSTOMER USE ONLY

II.1.5 SUPPLIER REQUEST FOR PRODUCT CHANGE

The Supplier Request for Product Change (SRPC) provides suppliers the opportunity to obtain specification relief for minor dimensional and/or standard variations that do not affect performance, assembly, quality, durability, warranty, customer satisfaction or cost.

The SRPC is not a means to avoid making the parts "to print." The supplier is expected to make every effort to resolve discrepancies before resorting to an SRPC. All SRPCs should be written and approved prior to presenting the Warrant. Contact the respective DaimlerChrysler Corporation part approval activity for copies of the SRPC form and complete instructions on its use. Identify the approved SRPC (as SRPC#XXXX) in the Additional Engineering Change line of the Warrant.

II.1.6 INTERIM APPROVAL

II.1.6.1 INTERIM APPROVAL AUTHORIZATIONS

The Interim Approval Authorization (IAA) is a procedure to enable suppliers to meet production part submission dates and plant production requirements for late design changes. In these cases, the supplier will receive authorization from DaimlerChrysler Corporation through the Interim Approval Authorization (IAA) document. Parts **to specification** are supplied through the use of the IAA process until permanent tool/process parts are approved and available to meet production requirements.

Once parts are available from the permanent tooling/process, a new submission is required.

II.1.7 DaimlerChrysler Corporation Procurement and Supply Representative

All references to "customer" pertain to the DaimlerChrysler Procurement and Supply representative. The "customer product approval activity" pertains to DaimlerChrysler Corporation Powertrain, Stamping, and Component operation receiving facilities.

II.1.8 Third Party Laboratories

When DaimlerChrysler Corporation specifies the use of a third party laboratory, that laboratory must be approved by DaimlerChrysler Corporation or accredited through either an ILAC or APLAC member, e.g. American Association for Laboratory Accreditation (A2LA), the Standards Council of Canada (SCC) or the Laboratory Accreditation Bureau (L-A-B).

II.2 Ford-Specific Instructions

II.2.1 **Part Approval Activity** - For external suppliers this refers to the Ford Supplier Technical Assistance Office (STA) of, or representing, the customer. Internal operations should contact their responsible approval activity or the FAO Quality Office.

II.2.2 **ES (Engineering Specification)** - This is the Ford designation for the performance tests referred to in the body of this document.

II.2.3 **Substance Use Restrictions** - A statement indicating conformance with Ford Engineering Material Specification WSS-M99P9999-A1 is required on the material test report. (This specification is available from Materials Engineering). This specification results from regulations of the countries where Ford does business. These regulations apply equally to Ford and its suppliers. Therefore, this specification does not add any requirements, but does require the supplier to verify conformance with the specification and with relevant regulations in the country of manufacture and the country of the Ford receiving location.

Suppliers self-certify conformance to this specification and are not required to provide supporting test data.

NOTE: Plastic Parts Marking - suppliers of plastic parts are encourage to mark plastic (polymeric) parts with the appropriate ISO symbols to designate the type of polymer and filler/reinforcer used to fabricate the part (further information is provided in Ford material specification E-4 available on-line at https://web.keyinfo.ford.com/manuals/index.html and https://web.keyinfo.ford.com/supply/docs/e4.pdf). Affected suppliers are requested to indicate compliance on the PSW form, as appropriate.

II.2.4 **Interim Approvals** - When non-conformances on a production part submission are identified, the STA engineer shall contact the buyer and product engineer following local procedures. If the product engineer allows use of product affected by the non-conformance, product engineering shall initiate (and approve) an "alert" in the WERS system, specifying the time period or quantity for which the non-conforming product can be used. The supplier shall enter the alert number on the PSW form under "Additional Engineering Changes". **Once parts are available from the permanent tooling/process, a new part submission warrant (PSW) is required. Should incomplete or in-process test data result in an "alert", a new PSW is required upon availability of completed test data.**

II.2.5 **Control Plans** - Shall be developed by the supplier and be available for review by the customer as early as possible and in any case prior to the production part submission date. Control Plans must include all Critical and Significant characteristics. Product Engineering and Part approval activity signatory approval is required on Control Plans for Control Item (∇) products and for products so designated by Product Engineering (e.g., with an ES specifically requiring this approval). Some Ford quality activities may request that a copy of the approved Control Plan be attached to the Part Submission Warrant and forwarded to the customer part approval activity.

II.2.6 **Appearance Item Approvals** - All parts having appearance criteria (*) shall be reviewed by the Ford Design Quality Office. The completed Appearance Approval Report (form CFG01002) shall accompany this submission. After approval signatures have been obtained from the designated Ford Design Quality representative, the form shall be included with Warrant.

(*) NOTE: All interior, exterior, luggage compartment, and select underhood components which are visible to the customer. Appearance approval included but is not limited to overall appearance, color, texture, and gloss.

Refer to the Corporate Design *Decorative Component Approval Process* manual for detailed instructions.

For additional information, contact: Ford Design Quality, Ford Motor Company, Product Development Center, Mail Drop 533, PO Box 2110, Dearborn, MI, 48123; fax: 313-594-7705.

II.2.7 **Part Submission Level** - For external suppliers, PPAP submission level is controlled by the Ford STA Commodity Engineer based on Q1 status, correct PPAP usage/submittal, critical nature of components and product concerns. When conducting a bulk material PPAP, use conventions as detailed in Section I in this manual.

> **NOTE:** It is important that suppliers designated as Level 2-5 account for any additional time that may be required to obtain STA approval, when providing PSW promise date (If the STA Engineer is unavailable to approve the PPAP in a timely manner, the supplier should contact the STA Program Manager who may assign another engineer to disposition the PSW; for bulk materials, contact the Raw Materials STA Manager).

Internal operations should contact their responsible approval activity or the FAO Quality Office regarding PPAP submission level.

II.2.8 **Manage the Change** - The supplier shall develop and implement a process to manage change to ensure that any product (either revised or new) affected by revisions in design and process shall continue to meet all applicable specifications. A copy of the Supplier Checklist/Approval for Managing Change is provided for guidance on page 30.

All design changes shall be clearly described and reference the WERS Engineering Notice number under the "Additional Engineering Changes" on the PSW form. Questions regarding this requirement should be reviewed with the using Ford facility.

The customer using facility may request full or partial PPAP documentation from the supplier in addressing specific product related concerns - supplier data shall be readily available upon request.

All post Job #1 changes (e.g., running changes, new supplier sourcing, revised supplier manufacturing location, etc.) shall obtain functional approval from the customer using facility prior to shipping of production quantities.

NOTE: At Vehicle Operation facilities contact the Plant Vehicle Team (PVT) for functional approval.

If the component is used at multiple Ford facilities, then all using facilities must provide functional approval (a using facility may opt to waive functional approval in certain cases). Functional approval is provided at the bottom of the PSW form under "For Customer Use Only". Questions concerning the need for functional approval should be directed to the using Ford facilities.

II.2.9 **Family of Parts** - Suppliers are permitted to submit multiple part numbers (same family of parts) on a single PSW with all part specifics (e.g., prefix, base, suffix) clearly noted on the PSW.

II.2.10 **Labeling Requirement** - Suppliers to Ford European facilities are required to affix orange labels (Form EU 3441, minimum A5 size) on all four sides of the packaging for all shipments of new or changed product to each using Ford facility. Powertrain suppliers are required to include their unique supplier generated PSW number on each label of the PSW shipment (ongoing shipments are excluded from this requirement).

II.2.11 **Run at Rate** - Run at rate is an integral part of the sample submission (PSW) for suppliers and which provides the basis to extract capability data and inspection layout data. All production tooling shall be in place and running at full production feeds and speeds, using all regular production direct and indirect personnel and support systems (**QS-9000**, Section II, Ford-Specific Requirements)

II.2.12 **Qualified Laboratory Documentation** - Laboratory scope and documentation requirements (**PPAP**, Section I.2.2.11) are not applicable to Ford suppliers.

II.2.13 **Supplier Request for Engineering Approval (SREA)** - The SREA procedure applies to all internal and external suppliers without on-line WERS capability. Ford product engineering approval of a SREA is required prior to implementing the change. Once Ford product engineering determines that the change is feasible and a SREA is required, the supplier will complete and submit the SREA, Form 1638, to the responsible product engineer.

Once approval is granted, a copy of the approved SREA shall be included in the PSW submission; powertrain suppliers shall also provide a copy of the approved SREA to the using customer facility.

Process Changes

The supplier is empowered to implement process changes without issuing and obtaining SREA approval with the following exceptions:

- Change in heat treat, plating/coating and solderability.
- Changes to the manufacture of supplier-designed electronic components (capacitors, resistors, integrated circuits and similar components).
- Re-location of product to a different manufacturing location.

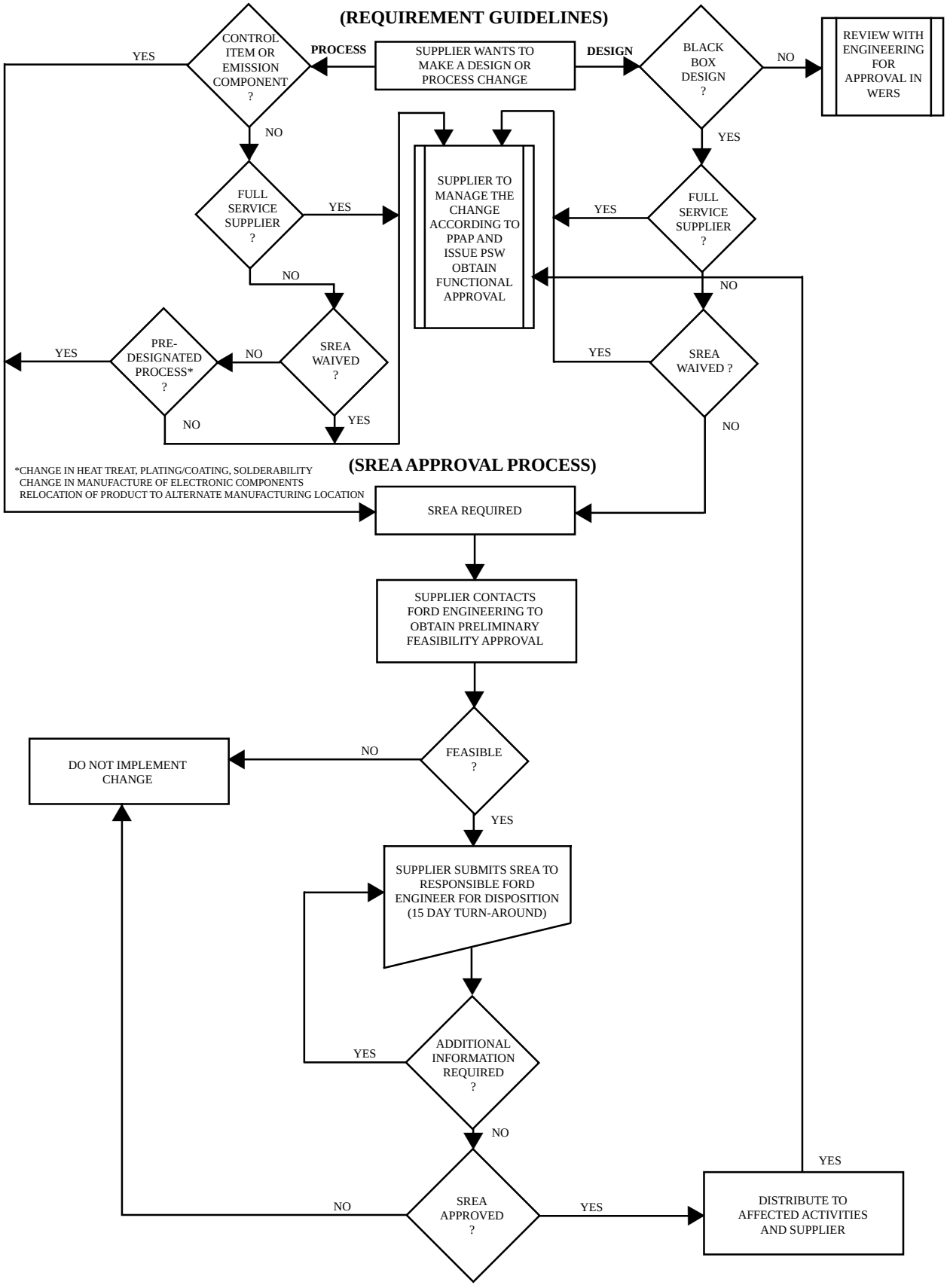
These exceptions will be waived once a supplier achieves Full Service Supplier status or is released from the SREA requirement by the responsible design activity.

Changes to the process of control item (∇) parts or emission components always require issuance of a SREA. No waivers apply for these components.

- Ford reserves the right to require that additional process changes be subject to SREA submission based on each supplier's performance in managing the change process. Suppliers are responsible for implementing this procedure with subcontractors.

- Refer to the following flow diagram for the elements of the SREA process.

SUPPLIER REQUEST FOR ENGINEERING APPROVAL (SREA)



For notifying the appropriate Ford system of completion of the PSW:

Suppliers on DDL (Direct Data Link) self enter their PSW approval into appropriate Ford PSW tracking system (EASI, CMMS Parts Progress, ELECT) per table below. Non-DDL suppliers shall follow local practices required to accommodate differing Ford systems to facilitate proper entry.

PPAP Level	SUPPLIER	STA ENGINEER APPROVAL OF PSW DATA PACKAGE	DATA ENTRY OF APPROVAL
<u>*Level 1*</u> DDL	- Prepare PPAP data package/self approve. - Assign unique number to each PSW * - Provide sample parts/PSW to using Ford facilities for functional approval/ waiver. - Fax copy of PSW to using powertrain plant when parts are shipped * - Enter approval in Ford System. - Maintain the completed PPAP data package on file.	Not required. Supplier self certifies. (Supplier submission not required)	Supplier enters in Ford system.
Non-DDL	- Prepare PPAP data package/self approve. - Assign unique number to each PSW * - Provide sample parts/PSW to using Ford facilities for functional approval/ waiver. - Fax copy of PSW to using powertrain plant when parts are shipped * - Contact FAO Production Purchasing and report PPAP data package approval status. - Maintain the completed PPAP data package on file.	Not required. Supplier self certifies. (Supplier submission not required)	FAO Production Purchasing enters approval, per local practice.
<u>*Level 2-5*</u> DDL	- Prepare PPAP data package. - Get STA approval. - Assign unique number to each PSW * - Provide sample parts/PSW to using Ford facilities for functional approval/ waiver. - Fax copy of PSW to using powertrain plant when parts are shipped * - Enter approval in Ford system after STA approval of PPAP data package. - Maintain the completed PPAP package on file.	- Approve PPAP data package/ sign warrant. - Return PPAP data package to supplier.	Supplier enters in Ford system after STA approval of PPAP data package.

PPAP Level	SUPPLIER	STA ENGINEER APPROVAL OF PSW DATA PACKAGE	DATA ENTRY OF APPROVAL
Non-DDL	- Prepare package. - Get STA approval. - Assign unique number to each PSW ***** - Provide sample parts/PSW to using Ford facilities for functional approval/waiver. - Fax copy of PSW to using powertrain plant when parts are shipped * - Contact FOA Production Purchasing and report PPAP data package approval status. - Maintain the completed PPAP package on file.	- Approve PPAP data package/ sign warrant. - Return PPAP data package to supplier.	FAO Production Purchasing enters approval, per local practice after STA approval of PPAP data package.

*** applies only to suppliers to powertrain operations**

NOTE: JAGUAR IS EXEMPTED FROM THIS PROCESS.

PSW SUBMISSION LOCAL PRACTICES

Supplier or STA Engineer will handle approved warrant per local practices below:

Purchase Orders Issued in North America		**Purchase Orders Issued in Europe**
PTO	Vehicle Operations	All Operations
NON-DDL SUPPLIERS: - Fax (or hand deliver to onsite drop box) copy of the approved warrant to Timing Analyst. - Analyst enters approval. **NOTE:** Supplier must allow for STA approval timing, where required, in Sample Promise Date.	**NON-DDL SUPPLIERS:** - Notify Material Follow-up Analyst when PPAP data package is approved. - Analyst will enter approval in the Ford PPAP tracking software.	- Send copy of Approved Warrant to Buyer. - Buyer enters PPAP data package approval. - Buyer files copy of Warrant.

SUPPLIER CHECKLIST/APPROVAL for MANAGING CHANGE

Supplier Name	Part Name	Part Number
Mfg. Location Code	Vehicle Lines Affected	Ford Plants Affected
Change Description		

ANY ITEMS NOT REQUIRED, PLEASE EXPLAIN:	Reqd.	Complete	Date	Comments
1. Engineering and Manufacturing Disciplines:	____	____	____	_____
Layout/Detail/Assy Drawings	____	____	____	_____
Tolerance Stack-Up	____	____	____	_____
Installation Drawings	____	____	____	_____
Reliability Methods	____	____	____	_____
Process Sheets	____	____	____	_____
Engineering Specification	____	____	____	_____
Material Specification	____	____	____	_____
Supplier Component DFMEA	____	____	____	_____
Supplier System DFMEA	____	____	____	_____
Ford Component DFMEA	____	____	____	_____
Ford System DFMEA	____	____	____	_____
Process Flow Chart	____	____	____	_____
Supplier Component PFMEA	____	____	____	_____
Supplier System PFMEA	____	____	____	_____
Ford Component PFMEA	____	____	____	_____
Ford System PFMEA	____	____	____	_____
Ford SDS Update	____	____	____	_____
DV/PV/IP Test	____	____	____	_____
Vehicle Test	____	____	____	_____
Operator Instruction Sheets	____	____	____	_____
Tool & Gage Revisions	____	____	____	_____
Gage R&R Study	____	____	____	_____
Control Plan	____	____	____	_____
Production Trial Run	____	____	____	_____
Sub-Supplier Affect	____	____	____	_____
Service Parts	____	____	____	_____
2. Ford Feasibility Review				
Ford Design Engineer Approval	____	____	____	_____
SREA	____	____	____	_____
CR/CR	____	____	____	_____
Alert	____	____	____	_____
PSW	____	____	____	_____
Ford Plant Functional Approval	Use Part Submission Warrant (PSW) under “Customer Use Only”			
Purchase Order	____	____	____	_____
3. Approvals				

Engineering Manager: _____ Quality Manager: _____

Production Manager: _____ Plant Manager: _____

SUPPLIER REQUEST FOR ENGINEERING APPROVAL

DATE _____ 19 _____

SUPPLIER TO COMPLETE

SUPPLIER NAME AND ADDRESS

FORD AND/OR SUPPLIER PART NAME AND PART NUMBER OF ASSEMBLY AND ITS COMPONENTS

EMISSION CONTROL CODE NUMBER (SEE FORM 74-107) _____

CONTROL ITEM AFFECTED ☐ YES ☐ NO

DESCRIPTION OF CHANGE: ☐ DESIGN ☐ COMPOSITION ☐ WEIGHT ☐ PROCESSING

EFFECT OF CHANGE:

INTERCHANGEABILITY AFFECTED
ASSEMBLY ☐ YES ☐ NO
COMPONENTS ☐ YES ☐ NO

TIME REQ'D TO INCORPORATE CHANGE AFTER APPROVAL

TOOLING OR FACILITY CHANGES REQUIRED ☐ YES ☐ NO
IF YES, COST EFFECT $

WILL INCORPORATION OF CHANGE AFFECT SHIPPING SCHEDULE? ☐ YES ☐ NO

SIGNATURE _____
SUPPLIER REPRESENTATIVE

PIECE COST AFFECTED ☐ YES ☐ NO
IF YES, COST EFFECT $

PRODUCT ENGINEERING TO COMPLETE

☐ APPROVED* ☐ RELEASE ACTION REQ'D, NOTICE # _____ ☐ REJECTED

BY SIGNATURE _____	DATE	CONCURRED BY SIGNATURE_____	DATE

BLANKET APPROVAL GRANTED FOR SUBSEQUENT CHANGES WHICH ARE SAME AS DESCRIBED ABOVE ☐ YES ☐ NO	SUPPLIER CHECKLIST ATTACHED? ☐ YES ☐ NO	SAMPLE OF CHANGED COMPONENT REQUIRED ☐ YES ☐ NO

REASON FOR REJECTION OR QUALIFYING CONDITIONS OF ACCEPTANCE:

REVIEWED BY:

SQA _____ DATE _____ PURCHASING_____DATE _____

* This approval is granted upon the understanding that it is advisory in nature and in no manner changes the Sellers original responsibility for insuring that all characteristics, designated in the applicable engineering specifications and/or inherent in the samples as originally tested and approved, are maintained. Seller accepts full responsibility for the changes or types of changes listed above; and should such changes result in less satisfactory performance than experienced with the originally approved item, Seller will fully reimburse the Buyer for all expenses incurred to correct the deficiency.

CEG
JUL 92 **1638** (Previous editions may NOT be used)

II.3 General Motors Specific Instructions

II.3.1 Applicability

This procedure is applicable to production, service, and unitized service parts, raw materials purchased by or contracted to GM. It also applies to all commodities supplied by external independent suppliers, GM Allied and Affiliated suppliers, plus all commodities supplied to these suppliers (e.g., subcontractors and third tier suppliers). Please note that for bulk, raw, or indirect material, it is the Procuring Division's decision whether **PPAP** is required. When conducting a bulk material PPAP, use conventions as detailed in Section I in this manual.

II.3.2 Requirements For Part Approval

II.3.2.1 PSW Form (CFG-1001) (see I.2.2.13)

1. The supplier shall use one warrant per customer part number.
2. GM does not require the purchase order number (item #7).
3 Enter Buyer name, and/or Buyer Code, if known (item #15).
4. The Supplier Code referred to on the PSW and on the Appearance Approval Report is the full code assigned to the manufacturing location on the purchasing order.
5. The PSW shall be complete, legible and accurate. Warrants will not be accepted that have the following fields in error:

Part Number	item 2
Engineering Drawing Change Level	item 4
Weight	item 8
Supplier Code	item 11
Supplier Address	item 12
Reason for Submission	item 17
Supplier Authorized Signature	item 22

6. The supplier should include an EWO number with the engineering change level on the warrant.

II.3.2.2 Appearance Approval Report (see I.2.2.14)

1. Appearance Approval Report (AAR) (CFG-1002) for parts with color, grain, gloss or textiles

   NOTE: AAR is not required for surface quality of body in white (BIW) parts. Refer to the General Motors North America Surface Buyoff Procedure for Surface Requirements of BIW parts.

2. Appearance Approval may occur concurrently with part inspection and testing.

II.3.2.3 Sample Product (see I.2.2.16)

If submitting for Level 2 or 3, the supplier shall submit two sample parts unless otherwise specified by the procuring Division. For multiple processes, two sample parts per process e.g. two parts per cavity, tool, cells, assembly lines are required unless otherwise specified by the procuring division. The sample parts do not have to be the same part(s) that

were dimensionally measured and documented on the marked drawing or check sheet. All sample parts should be labeled with part number, change level, and supplier name.

II.3.2.4 Design Records (see I.2.2.1)

1. A marked drawing can be used for a full PPAP submission provided the drawing is signed by the product engineer, has an EWO number and is dated.
2. All Supplier design records shall be GM approved.
3. The supplier shall furnish evidence of conformance to print specifications of each detail component when requested.
4. For CAD parts that are databanked, the current level in the GM design databank is the inspection referee. The source of the data shall be provided with change level and date.

II.3.2.5 Material, Performance and Durability test results (see I.2.2.8)

1. When Material, Validation, Performance, Durability, Reliability, or other engineering requirements are on the design record, approval can occur in two ways.
   a) The supplier gets approval prior to **PPAP** and submits evidence of approval.
   b) The supplier submits the test data or results with the **PPAP** submission. Note that an additional drawing may be required by the procuring division.
2. All Laboratory data shall be less than one year old at time of initial submission. Test data shall be updated for engineering previous data is affected by the engineering change (s).
3. A GM-E364 form is required where the note " Engineering Approval required" or the stamp "Engineering source approval for functional performance" is checked "yes" and found on the drawing or design record (see I.2.2.3)

II.3.2.6 Control Plans (see I.2.2.12)

GM requires suppliers to document and submit (depending on submission level) their Pre-Launch Control Plan. For information on the Pre-Launch Control Plan, see section 3.7 of the Chrysler, Ford, General Motors **Advanced Product Quality Planning and Control Plan** reference manual. General Motors General Procedure GP-12 "Early Production Containment" proceduralizes the Pre-Launch Control Plan. All parts requiring production part approval (**PPAP**) shall also comply with GP-12 Early Production Containment.

Whenever a supplier is required to submit a Production Control Plan, they shall also submit a Pre-Launch Control Plan, as defined by GP-12.

II.3.2.7 Initial Process Study (see I.2.2.9)

The minimum required acceptance criteria for the PPAP initial study shall be a Cpk or Ppk of 1.67.

II.3.3 Customer Notification of Supplier-Initiated Changes

NOTE: The following does not include initial submissions, engineering changes, or changes described in Table I.3.3.:

1. The supplier shall review the proposed change with the procuring division prior to implementation to obtain concurrence per the division's local practice.

2. Sufficient information shall be provided to explain the detailed reason for the submission. Attachments are encouraged.
3. Level 1 submission should be checked.
4. GM will review the warrant and determine if the warrant is acceptable. If the warrant is acceptable the supplier shall receive the standard supplier notification authorizing shipment. If additional information or a higher submission is required, the supplier shall be notified by the procuring division.
5. For submissions other than "Initial Submission" and "Engineering Change(s)" sufficient information shall be provided to explain the detailed reason for the submission. Additional attachments are encouraged.

II.3.4 Situations Where Customer Notification is not Required

1. For item 1, table I.3.3, the supplier shall notify GM per II.3.3 Customer Notification of Supplier Initiated Changes.
2. Resubmission is not required for a design record update that reflects a change that was previously approved per a dated marked print with an EWO number and engineering signature per section I.2.2.2 and/or I.2.2.3.

II.3.5 Submission Levels (see I.4.1)

1. Suppliers are not required to maintain full documentation from their subcontractors if they have decision criteria and a process in place to establish the level of evidence required from their subcontractors, and the appropriate level of evidence on file at their location. Upon a Procuring Division's request for Production Part Approval Documentation, suppliers must comply within a reasonable period of time.

2. ***ATTENTION SUPPLIERS TO GENERAL MOTORS EUROPE: Level 2 shall be the default level for all submissions to General Motors Europe, unless specifically advised otherwise by the responsible part approval activity.***

II.3.6 Part Submission Status

A. Full Approval (see I.5.2.1)

1. Part meets all requirements as outlined on the GM approved drawing and in accordance with **PPAP**.
2. Drawing must be fully released or is a marked drawing accompanied by an EWO, product engineer's signature and date.
3. Multiple cavity tools can achieve full approval on individual cavities provided the cavity being submitted meets all the requirements outlined in the **PPAP** manual. Each submission for a multiple cavity tool must specify the cavity and/or cavities that are being submitted for full approval.

B. Interim Approval (I.5.2.2)

1. If a part is not a "full approval", the Interim Approval will authorize the shipment to the customer. The status "Interim Approval" indicates the customer's decision to use the part without Full Approval.
2. All Interim Approvals require a corrective action plan. The Interim Recovery Worksheet (GM 1411), which has been developed for this purpose, is to be completed with the supplier.
3. If an extension is required, the GM 1411 must be re-issued and the interim date changed.
4. All Interim Approvals require the part number to be classified A, B, C, D, or E as follows:

Class A: Parts are produced using 100% production tooling and meet design record specifications. However, not all production approval requirements have been met.

Examples:

1. A capability study has been performed on less than 300 pieces and in the judgment of the SQE, satisfactory stability and capability has not been achieved. The supplier shall implement temporary containment actions until capability is achieved.
2. Documentation improvements required. Examples include DFMEA, PFMEA, Process Flow Diagram and Process Control Plan.
3. Part only lacks formal PPAP processing for statusing. Parts and data have been reviewed by the SQE and there is no indication of non-conformances.
4. Testing has not yet been completed and in the judgment of the appropriate engineer, usage of the parts does not pose a significant risk to customer dissatisfaction e.g. Long term material tests, long term functional test, environmental exposure etc. (Engineering signature is required).
5. Part and drawing do not match and a part change is not desired or anticipated. The interim worksheet must specify the differences between the part and the specification. The interim worksheet must document a commitment and date for the specification to be changed. (Engineer's signature required.)

Class B: Parts are produced using 100% production tooling and require rework to meet design record specifications as explained on the GM 1411 form.

Examples:

1. Parts have been produced not following the documented production process on the process flow diagram. Examples include trimming, sanding, buffing, etc. The process flow diagram includes any temporary operations except inspection. Added inspection alone should not be considered rework, but instead documented in the GP-12 plan and/or the process flow diagram and process control plan.

Class C: Parts are not produced using 100% production tooling and/or production processes, but meet design record specifications as explained on the GM 1411 form.

Examples:

1. Parts have been produced using additional, substitute or temporary tooling.
2. Parts have not been manufactured completely at the production site/environment.

   NOTE: If low volume tools are intended to meet current production needs submit for full production approval.

Class D: Parts do not meet design record specifications as explained on the GM 1411 form.

Examples:

1. Dimensional, material validation/functional testing or appearance characteristics that do not met design record requirements but will not impact vehicle assembly or customer satisfaction. Product engineer signature is required.

Class E: Parts do not meet design record specifications as explained on the GM 1411 form. Vehicles with Class E parts require retrofit to make them saleable.

Examples:

1. Dimensional, material validation/functional testing or appearance characteristics that do not meet design record requirements and will impact vehicle assembly or customer satisfaction. Product engineer signature is required.

2. Incomplete testing with high probability of failure and/or failed performance/functional material testing. Parts require retrofit for saleable status. Product engineer signature required.

3. Incomplete FMVSS testing.

C. Rejected (see I.5.2.3)

The part or associated documentation does not meet specified requirements. A resubmission shall be required. Shipment of parts is not permitted.

D. Reciprocity of part submission status within GM

1. Production approval status from one GM Division applies to all GM. Suppliers do not need to reevaluate the part or resubmit documentation, solely because the part will be used by another GM location. A copy of the warrant and the document signifying approval must be supplied to the new using division. The new using division reserves the right to review the PPAP information upon request.
2. Parts may be requested for a production trial run (PTR).
3. Interim approval granted by one division does not automatically guarantee authorization to ship to other GM locations.

II.3.7 Packaging and Labels

Each sample submission to General Motors shall be packaged separately and identified with the General Motors "Sample Submission for Production Approval" label, **GM Form 1387**. The information required on the label shall be added by the supplier prior to shipment. When several submissions are to be shipped in one larger container, a "Sample Submission for Production Approval" label, with only the "To" and "From" portion completed, shall be attached to the container at the upper right hand corner, visible from two sides. Each sample submission inside the larger container shall be packaged and labeled as specified. **Parts and paperwork shall be packaged together**.

INTERIM RECOVERY WORKSHEET

(GM 1411)

COMPLETION OF THE INTERIM RECOVERY WORKSHEET

Detailed Instructions for completion of Interim Recovery Worksheet (GM 1411)

Items 13 to 17, and item 19 are for customer PPAP group use only. For all other items, supplier must provide appropriate information in order to obtain interim approval.

1.	Supplier Name:	Name assigned to manufacturing location
2.	Supplier Code:	Supplier assigned DUNS number of the manufacturing location.
3.	Resubmission date:	New promise date or PPAP submission date. The supplier's commitment date to have the Corrective Action Plan item(s) completed and resubmitted to the PPAP group. Part Readiness tracks the re-submission date for follow-up when required. The re-submission date must be prior to the interim expiration date.
4.	Interim Expire Date:	The expiration date is the last acceptable date of shipment of the part under this Interim Approval status report.
5.	Application:	List programs where the part number is used.
6.	Part Name:	Engineering released finished end item name.
7.	Part Number:	GM 8 Digit Part Number submitted for PPAP.
8.	EWO#:	Engineering Work Order number, of the associated PPAP submission that authorizes print changes.
9.	ECL:	Engineering Change Level of the associated PPAP submission.
10.	ECL date:	Date of engineering change level submitted.
11.	Submission Level:	Submission Level 1 - 5. Enter submission level determined by the procuring division.
12.	KG Wt:	Enter the actual weight in kilograms to three decimal places.
13.	Sample Number:	The number of samples received under that part # for a given Duns location.
14.	Inspector/SQE:	Customer use only. Inspector/SQE initials.
15.	Additional Sample:	Additional sample parts required, specified by the metrology/PPAP lab.
16.	PKG#:	Package number assigned to the submission. Generated by GQTS.
17.	Interim #:	Interim number assigned by the procuring division to track interim submissions.
18.	Interim Class:	Type interim class or circle the appropriate interim class, A B C D E.

Class A - Parts are produced using 100% production tooling and meet design record specifications. However not all production approval requirements have been met.

Examples:

1. A capability study has not been completed: A capability study of less than 300 pieces and in the judgment of the SQE, satisfactory stability and capability has been achieved.
2. Documentation improvements required. Examples include DFMEA, PFMEA, Process Flow Diagram, and Process Control Plan.
3. Part only lacks formal PPAP processing for statusing. Parts and data have been reviewed by the SQE and there is no indication of non-conformances.
4. Testing has not yet been completed and in the judgment of the appropriate engineer, usage of the parts does not pose a significant risk to customer dissatisfaction e.g. Long term material performance tests, long term functional test, environmental exposure etc. (Engineer signature required).
5. Part and drawing do not match and a part change is not desired or anticipated. The interim worksheet must specify the differences between the part and the specification. The interim worksheet must document a commitment and date for the specification to be changed. (Engineer's signature required.)

Class B - Parts are produced using 100% production tooling and require rework to meet design record specifications.

Examples:

1. Parts have been produced not following the documented production process on the Process Flow Diagram. Examples include trimming, sanding, buffing, etc. Process Flow Diagram includes any temporary operations except inspection. Added inspection alone should not be considered rework but, instead, documented in the GP-12 plan and/or the Process Flow Diagram and the Process Control Plan.

Class C - Parts are produced using non-production tooling and/or process but, meet design record specifications.

Examples:

1. Parts have been produced using additional, substitute, or temporary tooling.
2. Parts have not been manufactured completely at the production site/environment.
3. Note: If low volume tools are intended to meet current production needs submit for a full PPAP approval.

Class D - Parts do not meet design record specifications.

Example:

1. Dimensional, Material validation/functional testing or appearance characteristics that do not meet design record requirements but will not impact vehicle assembly or customer satisfaction. (Product engineer and/or Assembly plant signature is required)

Class E - Parts do not meet design record specifications. Vehicles with class E parts require retrofit to make them saleable.

Examples:

1. Dimensional, material or appearance characteristics that do not meet design record requirements and will impact vehicle assembly and/or customer requirements. (Product Engineer and/or Assembly plant signature is required.)
2. Incomplete testing with a high probability of failure and/or a failed performance/functional material testing. Part requires retrofit for saleable status. (Product Engineer and/or Assembly Plant signature is required.)
3. Incomplete FMVSS testing.

19.	Status:	Enter appropriate letter (A= Approved, I= Interim required, N= Not Made).
20.	Brief Reasons:	Provide a brief reason for requesting an interim approval. Where applicable specify if tooling modifications or other modifications were made.
21.	Issues /Action Plan(s):	List all issues applicable, and use additional sheets if necessary. For non-grained parts, submit on Less Finish part number. For color /Gloss issues submit on color part number. Provide a corrective action plan with date of completion, when requesting for approval
22.	GP-12:	Describe how Early Production Containment will be used to document countermeasures offsetting interim issues listed on the GM1411 (interim recovery worksheet). If GP-12 is not used to document countermeasures an explanation is required.
23.	Supplier:	Required supplier authorized signature from responsible supplier official to ensure compliance to the information provided for Interim approval, legibly print or type name, title and include phone and fax number.
24.	Customer Approvals:	Obtain appropriate signatures from customer for areas of concern. Suppliers must have SQE's approval for all interim classes and release engineer's approval for interim D and E. Requirements are subjected to change and may vary for each procuring division. ask SQE for details.

Attach Part Submission Warrant with Customer approvals in order to have interim processed and send to processing group. Interim Approvals can be obtained in person, fax, mail or via E-mail.

GM INTERIM RECOVERY WORKSHEET (GM 1411)

Supplier

SUPPLIER NAME: 1 **PART NAME:** 6

SUPPLIER CODE: 2 **PART #:** 7

RESUBMISSION DATE: 3

INTERIM EXPIRE DATE: 4 **EWO#:** 8

APPLICATION: 5 **ECL:** 9 **DATE:** 10

SUBMISSION LEVEL: 11 KG Wt: 12

SAMPLE #: 13 INSP/SQE: 14 ADD. SAMPLE: 15 PKG: 16 Interim# 17

Customer

18 INTERIM CLASS (Type interim class or circle for manual entry):

A	B	C	D	E

19 STATUS: Type or fill in appropriate status (A=Approved, I = Interim, N = Not made).

DIM: _____ **APP:** _____ **LAB:** _____ **PROCESS:** _____ **ENG:** _____

Supplier

20 BRIEF REASONS (116 characters max.): _____

21 ISSUES: (List DIM, APP, LAB, Process, tooling, capacity,o r start-up issues)	**ACTION PLANS** (provide with date of completion)

22 WHERE APPLICABLE, ARE INTERIM ISSUES ADDRESSED ON THE GP-12 PLAN? (e.g. rework, temporary operations)
(Please explain below): _____

23 SUPPLIER (Authorized signature): _____ **PHONE:** _____

NAME & TITLE: (Print) _____ **FAX:** _____

PART SUBMISSION WARRANT MUST BE INCLUDED WITH CUSTOMER APPROVALS IN ORDER TO PROCESS YOUR REQUEST AND SEND TO THE PROCURING DIVISION.

Customer

24 CUSTOMER APPROVALS: **SIGNATURE** **NAME (Print)** **PHONE** **DATE**

SUPPLIER QUALITY ENGINEER: _____

PRODUCT ENGINEER (DRE): _____

LAB/MATERIAL ENGINEER: _____

APPEARANCE/PAINT ENGINEER: _____

OTHER (Buyer, Assembly Plant, etc.): _____

GM INTERIM RECOVERY WORKSHEET (GM 1411)

Supplier

SUPPLIER NAME: _____ **PART NAME:** _____

SUPPLIER CODE: _____ **PART #:** _____

RESUBMISSION DATE: _____

INTERIM EXPIRE DATE: _____ **EWO#:** _____

APPLICATION: _____ **ECL:** _____ **DATE:** _____

SUBMISSION LEVEL: _____ KG Wt: _____

SAMPLE #: _____ INSP/SQE: _____ ADD. SAMPLE: _____ PKG: _____ Interim# _____

Customer

INTERIM CLASS (Type interim class or circle for manual entry):

A	B	C	D	E

STATUS: Type or fill in appropriate status (A=Approved, I = Interim, N = Not made).

DIM: _____ **APP:** _____ **LAB:** _____ **PROCESS:** _____ **ENG:** _____

Supplier

BRIEF REASONS (116 characters max.): _____

ISSUES: (List DIM, APP, LAB, Process, tooling, capacity,o r start-up issues)	**ACTION PLANS** (provide with date of completion)

WHERE APPLICABLE, ARE INTERIM ISSUES ADDRESSED ON THE GP-12 PLAN? (e.g. rework, temporary operations)
(Please explain below):

SUPPLIER (Authorized signature): _____ **PHONE:** _____

NAME & TITLE: (Print) _____ **FAX:** _____

PART SUBMISSION WARRANT MUST BE INCLUDED WITH CUSTOMER APPROVALS IN ORDER TO PROCESS YOUR REQUEST AND SEND TO THE PROCURING DIVISION.

Customer

CUSTOMER APPROVALS: **SIGNATURE** **NAME (Print)** **PHONE** **DATE**

SUPPLIER QUALITY ENGINEER: _____

PRODUCT ENGINEER (DRE): _____

LAB/MATERIAL ENGINEER: _____

APPEARANCE/PAINT ENGINEER: _____

OTHER (Buyer, Assembly Plant, etc.): _____

COMPLETION OF THE ENGINEERING SOURCE APPROVAL FOR FUNCTIONAL PERFORMANCE

1. Part number	GM 8 Digit Part Number submitted for PPAP.
2. Supplier Name	Name assigned to manufacturing location.
3. Part name	Engineering released finished end item name.
4. Duns Code	Supplier assigned duns number of the manufacturing location.
5. Application	List of programs where the part number is used.
6. ECL	Engineering change level of the associated PPAP submission.
7. EWO	Engineering work order number of the associated PPAP submission authorizing print changes.
8. Drawing Number	Drawing number on which part number appears.
9. Revision Date	Date of revision drawing that is being submitted.
10. Part meets engineering requirements	Indicate if the part meets all engineering requirements. If not refer to section IV on this form.
11. Comments	Provides area to make comments if desired.
12. Parts not meeting engineering requirements	Parts that do not meet the requirements shall not use the GM-E364. The supplier shall clearly document the non conformances on the GM 1411 and follow the interim approval process. The Supplier shall obtain engineering signatures on the GM 1411 form.
13. GM Product Engineer	Print product engineer or design release engineer's name.
14. Phone Number	Product/design release engineer phone number.
15. Signature	Product/design release engineer signature.
16. Date	The date the product/design release engineer signs the GM-E364.
17. Code	Product/design release engineer code.

Engineering Source Approval for Functional Performance

I. Part Number (s): ① Supplier: ②

Part Name: ③ Duns Code: ④

Application: ⑤ ECL: ⑥ EWO: ⑦

Drawing Number: ⑧ Revision Date: ⑨

II. The Part Meets All Engineering Performance Requirements. (e.g., Sub System Tech. Spec., Comp. Tech. Spec., Solar, Validation) ☐ Yes ⑩

III. Comments: ⑪

IV. Part not meeting all engineering requirements specified above (section III). Must be submitted on the GM1411 interim worksheet (the GM-E364 form does not apply). ⑫

V. GM Product Engineer: ⑬ (Print) Phone Number: ⑭

⑮ (Signature) Date: ⑯

⑰ (Code)

Supplier ⩾ GM Engineer (DRE) ⩾ Supplier ⩾ SQE/Part Approval Activity

Engineering Source Approval for Functional Performance

I. Part Number (s): _____ Supplier: _____

Part Name: _____ Duns Code: _____

Application: _____ ECL: _____ EWO: _____

Drawing Number: _____ Revision Date: _____

II. The Part Meets All Engineering Performance Requirements. (e.g., Sub System Tech. Spec., Comp. Tech. Spec., Solar, Validation) ☐ Yes

III. Comments: _____

_____

_____

_____

IV. Part not meeting all engineering requirements specified above (section III). Must be submitted on the GM1411 interim worksheet (the GM-E364 form does not apply).

V. GM Product Engineer: _____ Phone Number:
(Print)

_____ Date: _____
(Signature)

_____
(Code)

Supplier ⩾ GM Engineer (DRE) ⩾ Supplier ⩾ SQE/Part Approval Activity

II.4 Truck OEM-Specific Instructions

This truck specific section was developed to define those **PPAP** requirements, which are unique to subscribing North American Heavy Truck OEMs. When completing PPAPs for the subscribing truck OEMs, this section will be applicable. This section of **PPAP** was developed by Automotive Industry Action Group (AIAG) in conjunction with the Truck and Heavy Equipment Group (THEG).

PPAP PROCESS REQUIREMENTS

II.4.1 Significant Production Run (see I.2.1)

The purpose of the production trial run is to ensure the effectiveness of the manufacturing process by running production products off of production tools, materials, equipment, cycle times, and environments while using production operators, gages, and other production methods. It is imperative that adequate quantities of parts be manufactured during this run to sufficiently sample, test, and thoroughly try out the production process (at rate) prior to full production. Since parts from the production trial run must be used to inspect and test for the initial sample submission, it is mandatory that production processes and environments be used for this trial run. It is also mandatory to insure that sufficient quantities of parts are run for preliminary process capability studies and for validation testing.

Since production trial runs in the truck industry are typically small, it is recommended that a maximum number of production parts be run during the trial run to insure production has ample time to prove out the process, while yielding sufficient quantities of parts to perform process capability studies. It is recognized that sample sizes as small as 30 pieces may be utilized for preliminary process capability studies. Sample sizes must be discussed and agreed to early in the **APQP** process.

If projected volumes are so low that 30 samples are not attainable prior to production, interim **PPAP** approval may be granted. A dimensional report with 100% inspection on special characteristics is required during the interim period. Once the 30 production samples are produced, measured and the quality index calculated and accepted, then the interim approval is changed to full approval.

II.4.2 Dimensional and Test Results Clarification (see I.2.2.7 and I.2.2.8)

Checked prints are not accepted within the truck industry. The supplier shall submit, as part of the **PPAP** package, a copy of the drawing with each dimension, test, and or specification identified with a unique number. These unique numbers shall be entered onto the dimensional or test results sheet as applicable, and actual results entered onto the appropriate sheets. The supplier shall also identify print zone for each numbered characteristic as applicable.

II.4.3 Initial Process Studies - General (see I.2.2.9)

Due to the fact that small production trial runs are common in the truck industry, the supplier shall use the guidelines described in II.4.1 above to maximize the number of parts run during the production trial run in order to have as many parts as possible available to inspect for capability studies. Truck manufacturers require a minimum of 30 production pieces be studied for preliminary process capability.

When the customer specifies special characteristics and the estimated annual usage is less than 500 pieces, the supplier shall document in their control plan that they will either:

- perform 100% inspection and record the results

OR

- conduct an initial process capability study with a minimum of 30 production pieces and maintain *SPC* control charts of the characteristics during production.

For special characteristics that can be studied using variable data, the supplier shall utilize one of the following techniques to study the stability of the process:

- X-Bar and R Charts, n=5, plot minimum 6 subgroups

OR

- Individual X - Moving Range, plot minimum 30 data points

When performing the initial short term study, data shall be plotted from consecutive parts taken from the production trial run. These studies could be augmented or replaced by long term results from the same or similar process run on the same equipment with prior customer concurrence.

II.4.4 Acceptance Criteria for Initial Study (see I.2.2.9.3)

For initial process capability studies using 30 to 300 parts, the supplier shall use the following as acceptance criteria for evaluating initial process study results for processes that appear stable:

For attribute features contact customer for appropriate sample size and statistical method.

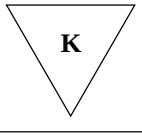
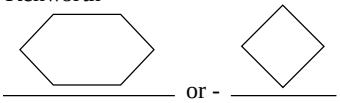
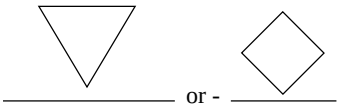
Where the Customer has a long term Minimum Capability Requirement of:	**The Short Term (30 Piece Capability Study) Minimum Acceptance Criteria is:**
≥ 1.00	≥ 1.33
≥ 1.33	≥ 1.79
≥ 1.67	≥ 2.24

II.4.5 Measurement System Analysis Studies (see I.2.2.10)

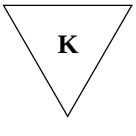
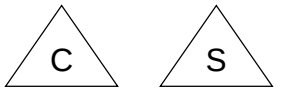
The supplier shall have Measurement System Analysis studies, e.g. gage R&R, bias, linearity, stability studies, for all gages and equipment used to measure special product characteristics or special process parameters. **Measurement System Analysis** studies for gage families is not acceptable.

II.4.6 Special Characteristic Requirements

SAFETY AND/OR GOVERNMENT RELATED PART OR CHARACTERISTICS

CUSTOMER	TERM	SYMBOL
Freightliner	Key Characteristics	
Mack Trucks, Inc.	Key Control Characteristics (KCC)	
Navistar	Key Control Characteristics (KCC)	
PACCAR	QA Codes (1,2,3 or 4) inside symbol in title block	Kenworth  or - Peterbilt  or -
Volvo Truck s N.A.	QA Codes (1 or 2) inside symbol in title block	[1] or [2]
Western Star	Refer to Western Star Part Drawings	

IMPORTANT PERFORMANCE, FIT OR APPEARANCE CHARACTERISTICS

CUSTOMER	TERM	SYMBOL
Freightliner	Key Characteristics	
Mack Trucks	Key Control Characteristics (KCC)	
Navistar	Key Control Characteristics (KCC)	
PACCAR	Critical Characteristic (C) or Significant Characteristic (S)	
Volvo Truck s N.A.	Consequence Class	[1] [2] or [3]
Western Star	Refer to Western Star Part Drawings	

II.4.7 Part Submission Warrant

Suppliers to subscribing truck OEMs shall use the PSW form below instead of the PSW form in Appendix A. (see next page for North American Truck Industry PSW Form). The North American Truck Industry PSW form is the same as the automotive PSW except for the declaration statement, which is worded more properly for the truck industry. Instructions for completing the form are the same as described on page 52.

North American Truck Industry **Part Submission Warrant**

Part Name (1) _____ Part Number (2) _____

Safety and/or Government Regulation ☐ Yes (3) ☐ No Engineering Drawing Change Level (4) _____ Dated _____

Additional Engineering Changes (5) _____ Dated _____

Shown on Drawing No. (6) _____ Purchase Order No. (7) _____ Weight (8) _____ kg

Checking Aid No. (9) _____ Engineering Change Level (10) _____ Dated _____

SUPPLIER MANUFACTURING INFORMATION

(11) _____
Supplier Name & Supplier Code

(12) _____
Street Address

_____
City/State/Postal Code

SUBMISSION INFORMATION (13)

☐ Dimensional ☐ Materials/Functional ☐ Appearance

Customer Name/Division (14) _____

Buyer/Buyer Code (15) _____

Application (16) _____

Note: **Does this part contain any restricted or reportable substances.** ☐ Yes ☐ No

Are plastic parts identified with appropriate ISO marking codes ☐ Yes ☐ No

REASON FOR SUBMISSION (17)

☐ Initial Submission
☐ Engineering Change(s)
☐ Tooling: Transfer, Replacement, Refurbishment, or additional
☐ Correction of Discrepancy
☐ Tooling Inactive > than 1 year
☐ Change to Optional Construction or Material
☐ Sub-Supplier or Material Source Change
☐ Change in Part Processing
☐ Parts Produced at Additional Location
☐ Other – please specify

REQUESTED SUBMISSION LEVEL (Check one) (18)

☐ Level 1 – Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
☐ Level 2 – Warrant with product samples and limited supporting data submitted to customer.
☐ Level 3 – Warrant with product samples and complete supporting data submitted to customer.
☐ Level 4 – Warrant and other requirements as defined by customer.
☐ Level 5 – Warrant with product samples and complete supporting data reviewed at supplier's manufacturing location.

(Circle) (1) 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

SUBMISSION RESULTS (19)

The results for ☐ dimensional measurements ☐ material and functional tests ☐ appearance criteria ☐ statistical process package
These results meet all drawing and specification requirements: ☐ Yes ☐ NO (If "NO" – Explanation Required)
Mold / Cavity / Production Process _____ (20)

DECLARATION

I hereby affirm that the samples represented by this certification are representative of our parts, have been made to the applicable customer drawings and specifications, and are made from the specified materials on regular production tooling with no operations other than the regular production process. I also certify that documented evidence of such compliance is on file and available for review.

EXPLANATION/COMMENTS: (21) _____

Print Name _____ Title _____ Phone No. _____ FAX No. _____

Supplier Authorized Signature (22) _____ Date _____

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☐ Approved ☐ Rejected ☐ Interim Approval

Part Functional Approval: ☐ Approved ☐ Waived

Customer Name _____ Customer Signature _____ Date _____

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North American Truck Industry

Part Submission Warrant

Part Name _____ Part Number _____

Safety and/or Government Regulation ☐ Yes ☐ No Engineering Drawing Change Level _____ Dated _____

Additional Engineering Changes _____ Dated _____

Shown on Drawing No. _____ Purchase Order No. _____ Weight _____ kg

Checking Aid No. _____ Engineering Change Level _____ Dated _____

SUPPLIER MANUFACTURING INFORMATION

_____
Supplier Name & Supplier Code

_____
Street Address

_____
City/State/Postal Code

SUBMISSION INFORMATION

☐ Dimensional ☐ Materials/Functional ☐ Appearance

Customer Name/Division _____

Buyer/Buyer Code _____

Application _____

Note: **Does this part contain any restricted or reportable substances.** ☐ Yes ☐ No

Are plastic parts identified with appropriate ISO marking codes ☐ Yes ☐ No

REASON FOR SUBMISSION

- ☐ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling: Transfer, Replacement, Refurbishment, or additional
- ☐ Correction of Discrepancy
- ☐ Tooling Inactive > than 1 year
- ☐ Change to Optional Construction or Material
- ☐ Sub-Supplier or Material Source Change
- ☐ Change in Part Processing
- ☐ Parts Produced at Additional Location
- ☐ Other – please specify

REQUESTED SUBMISSION LEVEL (Check one)

- ☐ Level 1 – Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
- ☐ Level 2 – Warrant with product samples and limited supporting data submitted to customer.
- ☐ Level 3 – Warrant with product samples and complete supporting data submitted to customer.
- ☐ Level 4 – Warrant and other requirements as defined by customer.
- ☐ Level 5 – Warrant with product samples and complete supporting data reviewed at supplier's manufacturing location.

(Circle)

(1) 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

SUBMISSION RESULTS

The results for ☐ dimensional measurements ☐ material and functional tests ☐ appearance criteria ☐ statistical process package

These results meet all drawing and specification requirements: ☐ Yes ☐ NO (If "NO" – Explanation Required)

Mold / Cavity / Production Process _____

DECLARATION

I hereby affirm that the samples represented by this certification are representative of our parts, have been made to the applicable customer drawings and specifications, and are made from the specified materials on regular production tooling with no operations other than the regular production process. I also certify that documented evidence of such compliance is on file and available for review.

EXPLANATION/COMMENTS: _____

Print Name _____ Title _____ Phone No. _____ FAX No. _____

Supplier Authorized Signature _____ Date _____

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☐ Approved ☐ Rejected ☐ Interim Approval

Part Functional Approval: ☐ Approved ☐ Waived

Customer Name _____ Customer Signature _____ Date _____

July 1999 TAG-1001

Appendix A

Completion of the Part Submission Warrant

PART INFORMATION

1. **Part Name** and 2. **Customer part number:** Engineering released finished end item part name and number.
3. **Safety/Regulated Item:** "Yes" if so indicated on part drawing, otherwise "No".
4. **Engineering Change Level & Approval Date:** Show change level and date for submission.
5. **Additional Engineering Changes:** List all authorized engineering changes not yet incorporated on the drawing but which are incorporated in the part.
6. **Shown on Drawing Number:** The design record that specifies the customer part number being submitted.
7. **Purchase Order Number:** Enter this number as found on the purchase order.
8. **Part Weight:** Enter the actual weight in kilograms to four decimal places.
9. **Checking Aid No.** Enter the checking aid number, if one is used for dimensional inspection, and,
10. Its **Engineering Change Level** and **Approval Date.**

SUPPLIER MANUFACTURING INFORMATION

11. **Supplier Name & Supplier Code:** Show the code assigned to the manufacturing location on the purchase order.
12. **Supplier Manufacturing Address:** Show the complete address of the location where the product was manufactured.

SUBMISSION INFORMATION

13. **Submission type:** Check box(es) to indicate type of submission.
14. **Customer Name:** Show the corporate name and division or operations group.
15. **Buyer Name:** and Buyer Code: Enter the buyer's name and code.
16. **Application:** Enter the model year, vehicle name, or engine, transmission, etc.

REASON FOR SUBMISSION

17. Check the appropriate box. Add explanatory details in the "other" section.

REQUESTED SUBMISSION LEVEL

18. Identify the submission level requested by your customer.

SUBMISSION RESULTS

19. Check the appropriate boxes for dimensional, material tests, performance tests, appearance evaluation, and statistical data.
20. Check the appropriate box. If "no", enter explanation in "comments" below.

DECLARATION

21. **Comments:** Provide any explanatory details on the submission results; additional information may be attached as appropriate.

22. The responsible supplier official, after verifying that the results show conformance to all customer requirements and that all required documentation is available shall approve the declaration and provide **Title, Phone Number,** and **Fax Number**.

FOR CUSTOMER USE ONLY

Leave blank.

DaimlerChrysler Ford GM

Part Submission Warrant

Part Name (1) _____ Part Number (2) _____

Safety and/or Government Regulation ☐ Yes (3) ☐ No Engineering Drawing Change Level (4) _____ Dated _____

Additional Engineering Changes (5) _____ Dated _____

Shown on Drawing No. (6) _____ Purchase Order No. (7) _____ Weight (kg) (8) _____

Checking Aid No. (9) _____ Engineering Change Level (10) _____ Dated _____

SUPPLIER MANUFACTURING INFORMATION

(11) _____
Supplier Name & Supplier Code

(12) _____
Street Address

_____
City State Zip

SUBMISSION INFORMATION (13)

☐ Dimensional ☐ Materials/Functional ☐ Appearance

Customer Name/Division (14) _____

Buyer/Buyer Code (15) _____

Application (16) _____

Note: **Does this part contain any restricted or reportable substances** ☐ Yes ☐ No

Are plastic parts identified with appropriate ISO marking codes ☐ Yes ☐ No

REASON FOR SUBMISSION (17)

☐ Initial Submission
☐ Engineering Change(s)
☐ Tooling: Transfer, Replacement, Refurbishment, or additional
☐ Correction of Discrepancy
☐ Tooling Inactive > than 1 year
☐ Change to Optional Construction or Material
☐ Sub-Supplier or Material Source Change
☐ Change in Part Processing
☐ Parts Produced at Additional Location
☐ Other – please specify

REQUESTED SUBMISSION LEVEL (Check one) (18)

☐ Level 1 – Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
☐ Level 2 – Warrant with product samples and limited supporting data submitted to customer.
☐ Level 3 – Warrant with product samples and complete supporting data submitted to customer.
☐ Level 4 – Warrant and other requirements as defined by customer.
☐ Level 5 – Warrant with product samples and complete supporting data reviewed at supplier's manufacturing location.

SUBMISSION RESULTS (19)

The results for ☐ dimensional measurements ☐ material and functional tests ☐ appearance criteria ☐ statistical process package

These results meet all drawing and specification requirements: ☐ Yes ☐ NO (If "NO" – Explanation Required)

Mold / Cavity / Production Process _____ (20)

DECLARATION

I hereby affirm that the samples represented by this warrent are representative of our parts, have been made to the applicable Production Part Approval Process Manual 3rd Edition Requirements. I further warrant these samples were produced at the production rate of _____ / 8 hours. I have noted any deviations from this declaration below.

EXPLANATION/COMMENTS: (21) _____

Print Name _____ Title _____ Phone No. _____ FAX No. _____

Supplier Authorized Signature (22) _____ Date _____

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

Part Functional Approval: ☐ Approved ☐ Waived

Customer Name _____ Customer Signature _____ Date _____

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The original copy of this document shall remain at the suppliers location while the part is active (see Glossary).

Optional: customer tracking number: # _____

DaimlerChrysler Ford GM

Part Submission Warrant

Part Name _____ Part Number _____

Safety and/or Government Regulation ☐ Yes ☐ No Engineering Drawing Change Level _____ Dated _____

Additional Engineering Changes _____ Dated _____

Shown on Drawing No. _____ Purchase Order No. _____ Weight (kg) _____

Checking Aid No. _____ Engineering Change Level _____ Dated _____

SUPPLIER MANUFACTURING INFORMATION

_____
Supplier Name & Supplier Code

_____
Street Address

_____
City State Zip

SUBMISSION INFORMATION

☐ Dimensional ☐ Materials/Functional ☐ Appearance

Customer Name/Division _____

Buyer/Buyer Code _____

Application _____

Note: Does this part contain any restricted or reportable substances. ☐ Yes ☐ No

Are plastic parts identified with appropriate ISO marking codes ☐ Yes ☐ No

REASON FOR SUBMISSION

☐ Initial Submission
☐ Engineering Change(s)
☐ Tooling: Transfer, Replacement, Refurbishment, or additional
☐ Correction of Discrepancy
☐ Tooling Inactive > than 1 year
☐ Change to Optional Construction or Material
☐ Sub-Supplier or Material Source Change
☐ Change in Part Processing
☐ Parts Produced at Additional Location
☐ Other – please specify

REQUESTED SUBMISSION LEVEL (Check one)

☐ Level 1 – Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
☐ Level 2 – Warrant with product samples and limited supporting data submitted to customer.
☐ Level 3 – Warrant with product samples and complete supporting data submitted to customer.
☐ Level 4 – Warrant and other requirements as defined by customer.
☐ Level 5 – Warrant with product samples and complete supporting data reviewed at supplier's manufacturing location.

SUBMISSION RESULTS

The results for ☐ dimensional measurements ☐ material and functional tests ☐ appearance criteria ☐ statistical process package

These results meet all drawing and specification requirements: ☐ Yes ☐ NO (If "NO" – Explanation Required)

Mold / Cavity / Production Process _____

DECLARATION

I hereby affirm that the samples represented by this warrent are representative of our parts, have been made to the applicable Production Part Approval Process Manual 3rd Edition Requirements. I further warrant these samples were produced at the production rate of _____ / 8 hours. I have noted any deviations from this declaration below.

EXPLANATION/COMMENTS: _____

Print Name _____ Title _____ Phone No. _____ FAX No. _____

Supplier Authorized Signature _____ Date _____

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

Part Functional Approval: ☐ Approved ☐ Waived

Customer Name _____ Customer Signature _____ Date _____

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The original copy of this document shall remain at the suppliers location while the part is active (see Glossary).

Optional: customer tracking number: # _____

Appendix B

Completion of the Appearance Approval Report

Note: DaimlerChrysler Appearance Approval Requirements (See II.1.4)

1. **Customer part number:** Engineering released customer part number.
2. **Drawing Number:** Use the number of the drawing on which the part is shown if different from the part number.
3. **Application:** Enter the model year(s) and vehicle or other program on which the part is used.
4. **Part Name:** Use the finished part name on the part drawing.
5. **Buyer Code:** Enter the code for specific buyer of part.

6/7. **E/C Level & Date:** Engineering change level and E/C date for this submission.

8. **Supplier Name:** Supplier responsible for submission (include subcontractor if applicable).
9. **Manufacturing Location:** Location where part was manufactured or assembled.
10. **Supplier Code:** Customer-assigned code for supplier location where the part was manufactured or assembled.
11. **Reason for Submission:** Check box(es) explaining the reason for this submission.
12. **Supplier Sourcing & Texture Information:** List all first surface tools, graining source(s), grain type(s), and grain and gloss masters used to check part.
13. **Pre-Texture Evaluation:** To be completed by customer representative (not used by GM).
14. **Color Suffix:** Use alphanumeric or numeric color identification.
15. **Tristimulus Data:** List numerical (colorimeter) data of submission part as compared to the customer-authorized master.
16. **Master Number:** Enter alphanumeric master identification (not used by Ford).
17. **Master Date:** Enter the date on which the master was approved.
18. **Material Type:** Identify first surface finish and substrate (i. e.: paint/ABS).
19. **Material Source:** Identify first surface and substrate suppliers. Example: Redspot/Dow.
20. **Color Evaluation, Hue, Value, Chroma, Metallic Brilliance & Gloss:** Visual assessment by customer.
21. **Color Shipping Suffix:** Color part number suffix or color number.
22. **Part Disposition:** To be determined by customer (approved or rejected).
23. **Comments:** General comments by the supplier or customer (optional).
24. **Supplier Signature, Phone No. & Date:** Supplier certification that the document information is accurate and meets all requirements specified.
25. **Customer Representative Signature & Date:** Customer approval signature.

THE AREAS INSIDE THE BOLD LINES ARE FOR CUSTOMER USE ONLY.

APPEARANCE APPROVAL REPORT

PART NUMBER (1)	DRAWING NUMBER (2)	APPLICATION (VEHICLES) (3)	
PART NAME (4)	BUYER CODE (5)	E/C LEVEL (6/7)	DATE
SUPPLIER NAME (8)	MANUFACTURING LOCATION (9)		SUPPLIER CODE (10)
REASON FOR SUBMISSION (11) ☐ PART SUBMISSION WARRANT PRE TEXTURE ☐ SPECIAL SAMPLE FIRST PRODUCTION SHIPMENT ☐ RE-SUBMISSION ENGINEERING CHANGE			OTHER

APPEARANCE EVALUATION

SUPPLIER SOURCING AND TEXTURE INFORMATION (12)	PRE-TEXTURE EVALUATION (13)	CUSTOMER REPRESENTATIVE SIGNATURE AND DATE
	CORRECT AND PROCEED	
	CORRECT AND RESUBMIT	
	APPROVED TO TEXTURE	

COLOR EVALUATION

(14) COLOR SUFFIX	(15) TRISTIMULUS DATA					(16) MASTER NUMBER	(17) MASTER DATE	(18) MATERIAL TYPE	(19) MATERIAL SOURCE	(20) HUGH				VALUE		CHROMA		GLOSS		METALLIC BRILLIANCE		(21) COLOR SHIPPING SUFFIX	(22) PART DISPOSITION
	DL*	Da*	Db*	DE*	CMC					RED	YEL	GRN	BLU	LIGHT	DARK	GRAY	CLEAN	HIGH	LOW	HIGH	LOW		

COMMENTS (23)

SUPPLIER SIGNATURE (25)	PHONE NO.	DATE	CUSTOMER REPRESENTATIVE SIGNATURE (25)	DATE

MAY 1995 CFG-1002

APPEARANCE APPROVAL REPORT

PART NUMBER	DRAWING NUMBER	APPLICATION (VEHICLES)	
PART NAME	BUYER CODE	E/C LEVEL	DATE
SUPPLIER NAME	MANUFACTURING LOCATION		SUPPLIER CODE

REASON FOR SUBMISSION	☐	PART SUBMISSION WARRANT	☐	SPECIAL SAMPLE	☐	RE-SUBMISSION	OTHER
	☐	PRE TEXTURE	☐	FIRST PRODUCTION SHIPMENT	☐	ENGINEERING CHANGE	

APPEARANCE EVALUATION

SUPPLIER SOURCING AND TEXTURE INFORMATION		PRE-TEXTURE EVALUATION	CUSTOMER REPRESENTATIVE SIGNATURE AND DATE
		CORRECT AND PROCEED	
		CORRECT AND RESUBMIT	
		APPROVED TO TEXTURE	

COLOR EVALUATION

COLOR SUFFIX	TRISTIMULUS DATA					MASTER NUMBER	MASTER DATE	MATERIAL TYPE	MATERIAL SOURCE	HUGH				VALUE		CHROMA		GLOSS		METALLIC BRILLIANCE		COLOR SHIPPING SUFFIX	PART DISPOSITION
	DL*	Da*	Db*	DE*	CMC					RED	YEL	GRN	BLU	LIGHT	DARK	GRAY	CLEAN	HIGH	LOW	HIGH	LOW		

COMMENTS

SUPPLIER SIGNATURE	PHONE NO.	DATE	CUSTOMER REPRESENTATIVE SIGNATURE	DATE

MAY 1995 CFG-1002

Appendix C

DaimlerChrysler Ford GM

Production Part Approval— Dimensional Results

Page_____ of_____ Pages

SUPPLIER	PART NUMBER
NAME OF INSPECTION FACILITY	PART NAME

ITEM	DIMENSION/SPECIFICATION		SUPPLIER MEASUREMENT RESULTS	OK	NOT OK

May 1995 CFG-1003

SIGNATURE	TITLE	DATE

Appendix D

DaimlerChrysler Ford GM

Production Part Approval—Material Test Results

Page_____of_____Pages

SUPPLIER	PART NUMBER
NAME OF LABORATORY	PART NAME

TYPE OF TEST	MATERIAL SPEC. NO./DATE/SPECIFICATION		SUPPLIER TEST RESULTS	OK	NOT OK

May 1995 CFG-1004

SIGNATURE	TITLE	DATE

Appendix E

Daimler Chrysler Ford GM

Production Part Approval—Performance Test Results

Page _____ of _____ Page

SUPPLIER	PART NUMBER
NAME OF LABORATORY	PART NAME

REF. NO.	REQUIREMENTS	TEST FREQ.	QTY. TESTED	SUPPLIER TEST RESULTS AND TEST CONDITIONS	OK	NOT OK

May 1995 CFG-1005

SIGNATURE	TITLE	DATE

Appendix F

Bulk Material - Specific Requirements

F.1 Introduction

A supplier of bulk materials shall comply with the requirements in this Appendix or use guidance herein for clarification of **PPAP**. This document is a minimum requirement and may be supplemented at the discretion of the supplier and/or the customer.

F.2 Applicability

OEM PPAP approval of a bulk material eliminates the need to complete **PPAP** for that material at other levels in the supply chain.

Suppliers are responsible for applying **PPAP** to their subcontractors of ingredients which have supplier-designated special characteristics.

Examples of bulk material include, but are not limited to: adhesives and sealants (solders, elastomers); chemicals (rinses, polishes, additives, treatments, colors/pigments, solvents); coatings (top coats, undercoats, primers, phosphates, surface treatments); engine coolants (antifreeze); fabrics; film and film laminates; ferrous and non-ferrous metals (bulk steel, aluminum, coils, ingots); foundry (sand/silica, alloying materials, other minerals/ores); fuels and fuel components; glass and glass components; lubricants (oils, greases, etc.); monomers, pre-polymers and polymers (rubbers, plastics, resins and their precursors); and performance fluids (transmission, power steering, brake, refrigerant).

F.3 Customer Plant Connection

F.3.1 Customer's Responsibilities

The customer plant connection is a **shared** responsibility between the bulk material supplier and the customer. This connection defines the interaction of specific customer plant processing steps with Special Characteristics and final product attributes of the bulk material. This interaction is especially significant when bulk materials undergo chemical or physical transformation(s). Three key components of the Customer Plant Connection are the development of a Customer Process Matrix (SEE FOLLOWING EXAMPLE), determination of Special Characteristics from the Customer Process Matrix, and the preparation of a Control Plan which systematically directs corrective actions. For bulk materials, conducting the steps outlined in this "Customer Plant Connection" is highly recommended.

NOTE: It is not the intent of PPAP to compromise proprietary information.

F.3.2 Customer Plant Connection - Clarification

The following is applicable to materials that are transformed from bulk (e.g. wet can of paint) to final product (e.g. cured paint film). This may not be applicable to all bulk materials (i.e. washer fluid, engine oil, etc.). It is recognized by the supplier that it is their responsibility to deliver the product to the customer with the characteristics of the bulk material per supplier and customer agreement.

The impact of the transformation of bulk materials by the customer plant on final product attributes may be accounted for in the customer's application process. During the transformation from bulk product to final product, both bulk product characteristics and final product attributes may be impacted by customer process controls.

PPAP does not require a Process FMEA or Control Plan for the customer process. Since the product is frequently two products (bulk and finished), there is a shared responsibility for the final product attribute. For example, percent solids and viscosity of a bulk coating which impacts the final coating's film build attribute, may be affected by the customer's mix room percent solvent reduction. The percent reduction process parameter may therefore be controlled to aid in control of film build. The process steps at customer plants may be matrixed versus the Special Characteristics (determined jointly by supplier and customer). Where high impact is evident, those process steps may be analyzed by the Process FMEA methodology.

The Special Characteristics may then be determined, and be included in a Control Plan for the customer process. These special control characteristic items may be monitored and continuously improved.

F.3.3 Customer Plant Connection - Guidelines

The following is a recommended set of guidelines for the customer plant when implementing process controls for bulk materials.

1. Assemble cross-functional teams of customer personnel for each customer process area. Include appropriate supplier representatives on each team.
2. Select Champions for each team - these are the customer process owners (i.e. chief process engineer, area supervisor, etc.).
3. Define critical customer handling, application steps and process parameters in each area.
4. Review the supplier's Design Matrix and Design FMEA items for application functions which have been designated as Special Characteristics. Also review the desired final product attributes for items needing control.
5. From #4, develop a list of Special Characteristics and Attributes.
6. Construct a Customer Process Matrix, using #3 as the top, and #5 as the side of a matrix.
7. Perform a Customer Process FMEA, focusing on the high impact customer process areas which impact the Special Characteristics. (Do the PFMEA per Appendix F).
8. Determine Special Characteristics from the Customer Process Matrix and PFMEA (e.g. paint fluid flow, gun distance, etc.).
9. Prepare a Control Plan for each affected customer process area. The plan (utilize DaimlerChrysler, Ford, GM **APQP** guidelines) might contain at a minimum all process steps containing Special Characteristics.
10. Monitor and record all Special Characteristics by appropriate means (control charts, checklists, etc.).
11. Ensure stability of Special Characteristics and continuously improve where possible.

Customer Process Matrix Example

	Customer Handling, Application Steps and Process Parameters											
Special Char. & Attributes	paint % reduc-tion	paint fluid flow	gun atomair	gun fan air	gun cap	gun dist-ance	gun wash box	booth temp	booth hum-idity	bake temp		
Dirt Check	1	1	2	2	**3**	1	**3**	1	**3**	1		
Film Build	**3**	**3**	2	2	2	**3**	1	1	1	1		
Sags	2	**3**	2	2	1	**3**	1	1	1	2		
Popping	2	**3**	**3**	2	1	2	1	**3**	1	**3**		
Peel	**3**	2	**3**	2	2	2	1	1	2	2		
Hiding	1	**3**	1	1	1	**3**	1	1	1	1		
Adhesion	1	1	1	1	1	1	1	1	1	**3**		

Impact Ratings: 3= High, 2= Medium, 1= Low

F.4 Part Submission Warrant (CFG-1001) [see I.2.2.13]

A Part Submission Warrant shall be prepared and submitted for approval when required by the customer. If a customer agrees that **PPAP** is not required, no warrant needs to be prepared. The information required by the Submission Warrant which does not apply to bulk material (i.e. part weight, dimensional measurement) does not need to be provided.

For those suppliers that have been classified as "self certifying" by a specific customer, submission of a warrant signed only by the supplier shall be evidence of **PPAP** approval, unless the supplier is advised otherwise. For all other suppliers, evidence of **PPAP** approval shall be a warrant signed by both the customer and supplier or other customer approval documents.

F.5 Design Matrix

F.5.1 Introduction

Bulk material suppliers generally deal with the chemistry and functionality of the product being designed. Use of these suggestions will arrive at the same end point of a completed Design FMEA, but with greater applicability to bulk materials. For bulk materials, a Design Matrix**,** when required, shall be prepared prior to developing the Design FMEA. The Design Matrix determines the complex interactions of formula ingredients, ingredient characteristics, product characteristics, process constraints, and conditions for customer use. High impact items can then be effectively analyzed in the Design FMEA.

F.5.2 Design Matrix – Elaboration

This matrix correlates customer expectations with the product design items.

Construct the Design Matrix referring to the example which will follow:

1. Along the horizontal axis, list the Functions (Desired Attributes/Potential Failure Modes).
2. Along the vertical axis, list the design items as Potential Causes (Category/Characteristics) :
   - Formula Ingredients
   - Ingredient Characteristics
   - Product Characteristics
   - Process Constraints
   - Conditions for Use (customer process constraints)
3. For each design item, enter the current robust threshold range levels and units.
4. Correlate the potential causes to the potential failure modes using a number, letter, or symbol representing the impact or strength of the relationship. Ask what would happen if a potential cause item is allowed to go under or over its robust minimum or maximum, respectively.
5. After completion of the rankings in the Design Matrix, review the category/characteristics for a preliminary assessment of Special Characteristics. Designate any Special Characteristics in column 1.
6. The high negative impact potential causes are transferred to the Design FMEA for analysis.

DESIGN MATRIX — GENERIC PAINT EXAMPLE

Product Code/Description: xxR-yyyyy Basecoat Paint					Project #: 00001																																				
	POTENTIAL CAUSES				**FUNCTION - DESIRED ATTRIBUTES (POTENTIAL FAILURE MODES)**																																						
Prelim. Special Characteristics	**CATEGORY / CHARACTERISTICS**	FAILURE	ROBUST THRESHOLD RANGE	UNITS	**APPEARANCE**	Good Gloss / Image / Peel	No Telegraphing	No Pinholing	No Mudcracking	Dirt / Seed Free	Crater Free	Good Color Match	**PERFORMANCE**	Good Accelerated Durability	Good Florida Durability	Good Chip Resistance	Good Crack Resistance	Good Delamination Resistance	Good Repair Adhesion	Good FMVSS (Windshield Adh)	**PROCESSABILITY**	Good Sag Resistance	Workable Visc/Atomization	Good Shelf Stability	Good Circulation Stability	Stable Rheology	Ne Edge Pull	Good Hiding Latitude	Good Overspray Compatibility	Good Repair Processability	**ENVIRONMENTAL**	Low/Acceptable VOC	Low/Acceptable Odor	HAPS Compliant
	Formula Ingredients																																								
	Resin A	under	40%	Binder Solids		3	1	1	1	1	1	0		2	3	2	1	1	1	1		2	1	1	2	2	1	0	1	1		1	1	1
		over	50%	"		3	1	1	1	1	1	0		2	2	1	2	1	1	1		2	1	1	2	2	1	0	1	1		1	1	1
	Resin B	under	25%	Binder Solids		1	1	3	1	1	1	1		1	2	3	1	1	2	2		1	1	1	1	1	1	0	1	2		1	1	1
		over	35%	"		1	1	1	1	2	1	1		2	2	2	1	1	1	2		1	1	2	2	2	1	0	1	1		1	1	1
	Crosslinker	under	20%	Binder Solids		1	2	3	1	1	2	1		2	2	3	1	2	2	2		1	1	1	2	2	1	0	2	2		1	2	2
		over	30%	"		1	2	1	1	1	1	1		2	2	2	1	3	1	2		1	1	1	3	1	1	0	1	1		1	3	1
SP	Rheology Control Additive	under	0.50%	Total Solids		1	1	3	1	1	1	0		1	1	1	1	1	1	1		3	2	2	3	3	2	1	1	1		1	1	1
		over	2.5%	"		1	1	1	1	1	1	1		1	1	1	1	1	1	1		2	1	1	2	2	2	1	1	1		1	1	1
	Color Dispersion-B	under	1.00%	Total Solids		1	1	1	1	2	1	3		2	1	2	1	1	2	2		1	1	1	1	1	1	3	1	1		1	1	1
		over	2.00%	"		2	1	1	1	1	1	1		1	1	3	1	1	1	1		1	1	1	1	1	1	1	1	1		1	1	1
	Solvent D	under	5%	Formula Wgt.		3	1	2	2	1	2	0		1	1	1	1	1	1	1		1	2	1	1	2	2	0	2	2		1	1	1
		over	15%	"		2	1	1	1	1	1	1		1	1	1	1	1	1	1		3	2	1	2	2	3	0	2	1		3	2	3
	Alcohol Solvent	under	2%	Formula Wgt.		1	1	1	1	1	1	1		1	1	1	1	1	1	1		1	1	3	3	2	1	1	2	1		1	1	1
		under	4%	"		1	1	1	1	1	1	1		1	1	1	1	1	1	1		1	1	1	1	1	1	1	3	1		2	2	3
	Ingredient Characteristics																																								
	Resign A-Viscosity	under	30%	Poise (#1 @ 50)		3	2	1	1	1	2	0		1	1	1	1	1	1	1		1	2	2	2	2	1	1	1	1		1	0	1
		over	40%	"		2	1	1	1	1	1	1		1	1	1	1	1	1	1		1	3	2	1	3	1	1	2	1		1	0	1
SP	Crosslinker-Imino (-NH) %	under	1%	% Molar Comp.		1	1	1	1	1	1	0		1	2	2	2	2	2	2		1	1	1	1	1	1	0	2	2		0	0	0
		over	10%	"		1	1	1	1	3	2	1		1	2	3	3	2	2	3		1	1	1	1	1	1	0	3	1		1	1	1
	Product Characteristics																																								
SP	Viscosity	under	30 sec	#4 Ford Cup		2	2	1	1	1	2	2		1	1	1	1	1	1	1		3	3	2	3	2	3	1	2	1		1	0	1
		over	40 sec	"		1	1	1	1	1	1	3		1	1	1	1	1	1	1		2	3	1	3	1	1	1	1	1		1	0	1
SP	% NV Solids	under	57%	%N.V. @ 110ºC		1	1	1	2	1	1	1		1	1	1	1	1	1	1		2	2	2	2	2	2	1	2	1		3	1	1
		over	61%	"		1	1	1	1	1	1	1		1	1	1	1	1	1	1		2	2	3	2	2	2	1	1	1		1	1	1
	Resistivity	under	0.01	megaohms		2	1	1	0	0	2	0		0	0	0	0	0	0	0		1	3	1	1	1	1	0	2	1		1	1	1
		over	0.15	"		1	1	1	0	0	3	0		0	0	0	0	0	0	0		1	3	1	1	1	1	0	2	1		1	1	1
	Process Constraints																																								
	Batch Mixing Temp	under	70º	ºF		1	1	1	1	2	2	2		1	1	1	1	1	1	1		1	1	3	2	3	1	1	2	1		1	0	1
		over	110º	"		2	1	1	1	3	3	2		2	2	1	2	1	1	2		1	1	3	1	3	1	1	3	1		1	1	1
	Conditions for Use																																								
	Flash Time before Clear	under	1	minutes		3	1	3	2	1	1	2		1	1	1	1	1	1	1		3	0	0	0	0	2	1	1	1		1	1	0
		over	3	"		2	1	2	1	1	1	3		1	1	1	1	1	1	1		2	0	0	0	0	1	1	1	1		2	1	0
SP	Final Bake Temp.	over	250º	ºF		2	1	1	1	0	0	3		3	3	3	2	2	3	2		1	0	0	0	0	1	1	1	3		1	1	1
		under	275º	"		3	1	1	1	1	1	3		2	2	3	3	2	3	3		1	0	0	0	0	1	1	1	3		2	3	1

NEGATIVE IMPACT ON CUSTOMER EXPECTATIONS: HIGH=3; MED=2; LOW=1; NONE=0; UNKNOWN=?

F.6 Special Characteristics

F.6.1 Introduction

If product characteristics/attributes can have normal variation resulting in movement outside their design-intended robust range which results in significant impact, they are designated special, and must be controlled by special controls.

Special Characteristics - Clarification Table

#	Difference	Clarification	Example
1	Special Characteristics and/or Key Product and Key Control Characteristics	For Bulk Materials, a frequent occurrence is a transformation from bulk material to final product.	Illustrations of the flow of materials through final product follow (e.g. % solids Resin A, % UVA intended). These are not necessarily intended to be Special Characteristics.
		The differences between bulk product characteristics (features of the supplied product) and the final attributes (features of the transformed product) should be understood.	Examples of product characteristics are: viscosity, % NV Solids, % Resin "A". Examples of final product attributes are: appearance, film build, FMVSS safety, durability.
		During the design phase, the product characteristics can be controls for final product attributes. (This does not imply that they are control characteristics). During manufacture of the bulk material, process parameters are the control characteristics.	Examples of manufacturing process parameters (control characteristics) are: temperature, pressure, mix rate, test protocol.
		During transformation from bulk product to final product, both bulk product characteristics and final product attributes can be controlled by customer process control characteristics.	Examples of customer transformation process parameters (control characteristics) are: fluid flow, temperature/humidity, air pressure.
2	Symbols for customer-identified Special Characteristics	The suppliers may designate their own internal symbols to designate Special Characteristics in their working documents.	The supplier may choose to use "S" (Safety), or "sp" (special), or "K" (Key), etc.
		For customer-designated/identified Special Characteristics, the customer-specific symbols will be used for required customer documentation and required shipping labels.	The customer designated shield, delta, diamond, etc. will be used when required per customer identification.

F.6.2 Special Characteristics - Elaboration

For clarification purposes, the following figure is intended to demonstrate the flow of potential special characteristics through the supply chain.

Illustration of the flow of materials through final product:

Item A (Paint)	Item B (Paint)	Item C (Sealant)
Subcontractor (Tier II) Bulk Product Characteristic (Raw Material)	Subcontractor (Tier II) Bulk Product Characteristic (Raw Material)	Subcontractor (Tier II) Bulk Product Characteristic (Raw Material)
% Solids Resin "A"	**Purity Assay of UVA**	**Polymer Viscosity**
Subcontractor (Tier II) Mfg. Control Characteristic	Subcontractor (Tier II) Mfg. Control Characteristic	Subcontractor (Tier II) Mfg. Control Characteristic
Resin Synthesis Temperature	**Final Reaction Hold Time**	**End-Blocker Feed Rate**
Supplier (Tier I) Bulk Product Characteristic	Supplier (Tier I) Bulk Product Characteristic	Supplier (Tier I) Bulk Product Characteristic
Paint Viscosity	**% UVA intended**	**% Polymer in Sealant**
Supplier (Tier I) Mfg. Control Characteristic	Supplier (Tier I) Mfg. Control Characteristic	Supplier (Tier I) Mfg. Control Characteristic
Tank Mix Rate	**Scale Calibration**	**Polymer Feed Rate**
Customer Transformation Control Characteristic	Customer Transformation Control Characteristic	Customer Transformation Control Characteristic
% Solvent Reduction	**Fluid Flow** (for film build)	**Extruder Bead Size**
Final Product Attibute	Final Product Attibute	Final Product Attibute
Film Build; Free of Sags	**Excellent Durability**	**Leak Free Sealant**

F.7 Design FMEA (see I.2.2.4)

F.7.1 Effects of Failure and Severity Rankings

The following two steps provide an alternative method for identifying the Potential Effects of Failure and assigning a Severity Ranking.

List Effects of Failure

- Consumer Effects - General terms identifying the loss experienced by the ultimate user of the product (e.g. the car buyer).
- Customer Effects - General terms identifying the loss experienced by the intermediate user of your product (e.g. the vehicle manufacturer).

Assign a Severity Ranking to each Effect

- See the Severity Definition and Evaluation Criteria in the **Potential Failure Mode and Effects Analysis** reference manual.

- The goal for each of the items that multiply to arrive at the Risk Priority Number is to differentiate between the items in that category. The following figure provides a guideline for severity rankings. If your situation only uses a small portion of the scale then develop your own scale to improve the differentiation. If your situation is greater than two tiers back from the final consumer, then the guideline figure should be adjusted to reflect the effects that will be felt by your customer's customer.

Effects of Failure and Severity Rankings:

Stakeholder	Effects of Failure	Severity
Consumer (e.g. vehicle buyer)	**Owner Safety Problem**	**10**
	Major Owner Dissatisfaction (Loss of Owner Loyalty)	**8**
	Moderate Owner Dissatisfaction (Inconvenience)	**6**
	Minor Owner Dissatisfaction (Annoyance)	**4**
Customer (e.g. vehicle manufacturer)	**Plant Safety Problem**	**10**
	Possible Recall	**9**
	Line Stoppage	**8**
	Warranty Costs	**7**
	Scrap	**7**
	Regulatory Penalty	**7**
	Moderate Rework (e.g. < 20% or moderate repair)	**5**
	Plant Dissatisfaction	**4**
	Minor Rework (e.g. < 10% or simple repair)	**3**

F.7.2 Potential Cause(s)/Mechanisms of Failure and Design Matrix

From the Design Matrix (if used), list the high negative impact characteristics as the Potential Causes/Mechanisms of Failure which are associated with Potential Failure Modes.

Mechanisms are generally described as over or under a certain threshold. These thresholds define the boundaries of the product approval and subsequent requirements for change notification.

F.7.3 Likelihood of Occurrence Rankings

The following step provides an alternate method for assigning Occurrence ratings.

Rank Occurrence - the ranking scale in the **Potential Failure Mode and Effects Analysis** manual is difficult to relate to bulk materials and generally results in very low numbers with little differentiation in the ultimate risk. The following matrix is recommended as a replacement. It evaluates the frequency of occurrence based upon observed evidence the formulator has in the design.

Occurrence Matrix:

Formulation Occurrence Ranking	FREQUENCY		
Type of Evidence	**LOW**	**MODERATE**	**HIGH**
Actual Experience	1	4	7
Similar Experience	2	5	8
Assumption	3	6	9
No Background			10

Actual Experience: **Obtained from appropriate experimentation on the specific final product and the potential failure mode.**

Similar Experience: **Based upon similar products or processes and the potential failure mode.**

Assumption: **Based upon a clear understanding of the chemical impact of the material and the potential failure mode.**

Frequency ranking clarifications:

- **High is defined as – Repeated failures**
- **Moderate is defined as – Occasional failures**
- **Low is defined as – Relatively few failures**

F.7.4 Current Design Controls

Design Control: Supplementing the **Failure Mode Effects and Analysis** manual, bulk material design controls may also include:

- Designed Experiments (DOE's) - List experiment #'s
- Customer validation tests and trial runs - e.g. gravelometer panels, fender sprayouts (list customer reference #'s).
- Test protocols - list Test Methods, Standard Operating Procedures, etc.
- Variation of subcontractor specifications.
- Formulating practice robust ranges.

Design controls identified by a number should be available so that the relevant content of that control can be understood.

F.7.5 Likelihood of Detection Rankings

The next step provides an alternate method for assigning Detection rankings.

Rank Detection - the ranking scale in the **Potential Failure Mode and Effects Analysis** manual is difficult to relate to bulk materials and generally results in very low numbers with little differentiation in the ultimate risk. The following matrix may be used. It evaluates the Detection as the ability of the current Design Control to actually detect a cause of failure and/or failure mode based upon the assessed R&R's percent of specification range and the quality of evidence.

Detection Matrix:

Detection by Design Control	Testing Method R&R		
Quality of Evidence	**< 30%**	**30% - 100%**	**> 100%**
DOE (Response Surface Analysis)	1	2	7
Screening Experiments	3	4	8
Assumption/Experience	5	6	9
No Evidence			10

DOE (Response Surface Analysis): **Symmetric design space analyzed with appropriate statistical tools.**
Screening Experiments: **Screening design or ladder evaluation strategically set to develop DOE.**
Assumption/Experience: **Information/data based upon similar products or processes.**

NOTE: The above R&R limits are suggested unless otherwise agreed upon by the customer and the supplier. R&R calculations can initially be based using design matrix thresholds.

F.8 Process FMEA (see I.2.2.6)

Process FMEA Ranking Tables

SEVERITY RANKINGS

Severity of Effect	Ranking
Very High: Potential failure mode may result in a field failure (9), or constitute a safety hazard or noncompliance with a government regulation (10).	**9 - 10**
High: High degree of customer dissatisfaction due to the nature of the failure. May cause serious disruption to subsequent processing of the product or result in the product failing to meet its sales specifications. Will result in a customer complaint and product return. Failure is likely to be detected during the customer's final product testing.	**7 - 8**
Moderate: Failure causes some customer dissatisfaction and may result in a customer complaint or limitation on shelf life. The customer may need to make modifications or adjustments to their process to accommodate the material. The problem is likely to be detected as part of an incoming inspection or prior to use (4). The problem will be detected during processing (5). The problem will be detected in subsequent processing steps (6).	**4 - 6**
Low: Failure causing only a slight customer annoyance. Customer will notice only a slight deterioration or inconvenience with the product or processing of the product.	**2 - 3**
Minor: Reasonable to expect that the minor nature of this failure would not cause any real effect on the product or its processing by the customer. Customer will probably not even notice the failure.	**1**

OCCURRENCE RANKINGS

Frequency of Failure	Ranking
Very High: Failure is almost inevitable. Additional process steps are developed to deal with the failures.	**9 - 10**
High: Similar processes have experienced repeated failures. The process is not in statistical control.	**7 - 8**
Moderate: Similar processes have experienced occasional failures, but not in major proportions. Process is in statistical control.	**4 - 6**
Low: Similar processes have experienced isolated failures.	**3**
Very Low: Almost identical processes have experienced only isolated failures.	**2**
Remote: Failure is unlikely. No failures ever associated with almost identical processes. The process is in statistical control.	**1**

DETECTION RANKINGS

Likelihood and Location in the Process the Defect is Detected	Ranking
Absolute Certainty of Non-Detection: Controls will not or cannot detect the existence of the defect.	**10**
Very Low: Supplier controls probably will not detect the existence of the defect, but the defect may be detected by the customer.	**9**
Low: Controls may detect the existence of the defect, but detection may not occur until packaging is underway.	**7 - 8**
Moderate: Controls likely to detect the existence of the failure, but not until lot acceptance testing has been completed. Tests with a higher degree of variability will have the higher ranking.	**5 - 6**
High: Controls have a good chance of detecting the existence of the defect before the manufacturing process has been completed. In-Process testing is used to monitor the manufacturing process.	**3 - 4**
Very High/Early: Controls will almost certainly detect the existence of the defect before the product moves onto the next step in its manufacturing process. Important raw materials are controlled via supplier specifications.	**1 -2**

F.9 Control Plan (see I.2.2.12)

F.9.1 Introduction

The Bulk Material Control Plan serves as a mechanism to:

- Highlight Special Product/ Process Characteristics and their controls
- Link together sources of control methods, instructions and specification / tolerance limits and reference them in one document

Additionally, this control plan is not intended to recreate specification and/or tolerance limits that exist in other control sources such as batch tickets, work instructions and testing protocols.

F.9.2 Control Plan - Elaboration

Refer to the control plan format found in the **Advanced Product Quality Planning and Control Plan** reference manual.

- Prototype (when required) - A listing of tests, evaluations and their associated specifications/tolerances used to assess an experimental or developmental formulation. This may be the only control plan that is product specific.
- Pre-launch - Documentation of the product/process control characteristics, process controls affecting Special Characteristics, associated tests, and measurement systems employed during product scale up and prior to

normal production.
- Production - Documentation of the product/process control characteristics, process controls affecting Special Characteristics, associated tests, and measurement systems employed during normal production. Additional items may be included at the Supplier's discretion.

Pre-launch and production control plans may be applied to a family of products or specific processes.

F.10 Initial Process Studies For Special Characteristics (see I.2.2.9)

The manufacture of bulk materials consists of industries which span a variety of production processes, from high volume products to specialty products produced in small quantities no more than once or twice per year. Often the production process is completed or already in place before sufficient samples can be tested. By the time the product is made again, personnel and/or equipment may have changed. Also, these processes have numerous input variables, many control variables, and a variety of product variations. There are non-linearities - meaning for example that doubling the change in a particular input does not necessarily double the change in the output. The effects and relationships between all these variables and controls are also not usually known without error. Multiple processes are usually interconnected, sometimes with feedback loops. There are also timing considerations and delays in reaction time. Further, measurement of component variables are generally less precise than measurements of component parts, such that in many cases correlated variables must be used.

F.11 Measurement System Analysis (MSA) Studies (see I.2.2.10)

Bulk materials often require further processing after sampling in order to make a measurement.

Measurements are often destructive in nature and this prevents retesting the same sample.

Measurement variability is often much larger for properties important in the process industries (e.g. viscosity and purity) than it is for properties measured in mechanical industries (e.g. dimensions). Measurement may account for 50% or more of the total observed variation.

Standardized test methods (e.g. ASTM, AMS, ISO) are often followed. The supplier need not reverify bias, linearity, stability, and Gage R&R.

MSA studies are not required where standardized tests are used, however it is still important for the supplier to understand the measurement component of variation in the test methods used.

Customer agreement on the actual requirements for MSA for either non-standard test methods or "new-to-supplier" test methods should be obtained during the planning phase.

Any MSA studies should be applied to each test method associated with Special Characteristics, and not to each individual product measured by the test method. Therefore, the MSA studies should be conducted as broadly as possible across all products which use a particular test method. If the resulting variability is unacceptable, then either the studies should be conducted on a narrower class of products or action should be taken to improve the test method.

Bulk Materials Requirements Checklist Project:

	Required / Target Date	Primary Responsibility		Comments / Conditions	Approved by / date
		Customer	Supplier		
Product Design and Development Verification					
Design Matrix					
Design FMEA					
Special Product Characteristics					
Design Records					
Prototype Control Plan					
Appearance Approval Report					
Master Sample					
Test Results					
Dimensional Results					
Checking Aids					
Engineering Approval					
Process Design and Development Verification					
Process Flow Diagrams					
Process FMEA					
Special Process Characteristics					
Pre-launch Control Plan					
Production Control Plan					
Measurement System Studies					
Interim Approval					
Product and Process Validation					
Initial Process Studies					
Part Submission Warrant (CFG-1001)					
Elements to be completed as needed					
Customer Plant Connection					
Change Documentation					
Subcontractor Considerations					

Plan agreed to by: Name	Company/Title/Date

F.12 Bulk Materials Requirements Checklist (see I.2.2.15)

Use the Bulk Materials Requirements Checklist as follows:

- Required/Target Date: For each item listed in the checklist either enter a target date for completion of the element or enter "NR" for Not Required.
- Primary Responsibility - Customer: Identify by name or function the individual who will review and approve the element.
- Primary Responsibility - Supplier: Identify by name or function the individual who will assemble and assure the completeness of the element to be reviewed.
- Comments / Conditions: Identify any qualifying information or references to attached documents that provide specific information regarding the element. For example, this may include specific formats to be used for the Design Matrix or acceptable tolerances for Measurement System Analysis (MSA) studies.
- Approved by: Enter the initials of the Customer representative who has reviewed and accepted the element.
- Plan agreed to by: Identify the individuals who made and agreed upon the project plan.

F.13 Master Sample (see I.2.2.17)

F.13.1 Introduction

The requirements for master sample or equivalent should be agreed by the customer and supplier.

Physical Sample: Some bulk materials are stable and unchanging over an extended period of time (e.g. they do not significantly change physical or chemical composition, if properly stored, for decades). In this case, a physical sample will serve as a Master Sample.

Analytical Sample Record: Other bulk materials change with time, but can be precisely quantified by appropriate analytical techniques. In this case the analytical record (e.g. Ultra-Violet or Infra-Red spectra "fingerprint", Atomic Absorption or Gas Chromatographic-Mass Spectrometric analysis) is an appropriate Master Sample.

Manufacturing Sample Record: When bulk materials can not be distinctly identified or change over time, a manufacturing sample record should be generated. The record should include the information required to manufacture a "normal production size" run (lot or batch), according to the final "Production Control Plan" supporting the PSW. This record provides an "audit trail" to the information which may be stored in various documents and or electronic systems. The following is the basic information suggested to accomplish this task:

- The quantity of product produced.
- The important performance results.
- The raw materials utilized (including manufacturer, Lot # and important properties records).
- The critical equipment required to manufacture the bulk material.
- Analytical sample records, as described above, on the material as produced.
- Batch ticket used to manufacture the bulk material.

F.13.2 Paint Manufacturing Master Sample Record - Examples

The following figures show examples of paint manufacturing master records:

Paint Mfg Master Sample Record - Batch/Lot Mfg. Record

MFG. LOCATION: Plant #1 MFG. DATE: 12/5/97 Batch Number 1X97

Product Code: xxR-yyyyy Basecoat Product Name: White Basecoat Formula Date: 1/18/97

Lbs/Gals Req'd.: 1000 Gals.

Equip. ID.: Mixer #2

TESTING INFORMATION

Name	Test Method	Specifications
Wt/Gallon	TM001	10.50 - 10.70
% Non Volatile	TM004	57 - 61%
Viscosity	TM003	30 - 40 Secs

Ingredients	Amt.	Amt. Loaded	Lot/Tank #	Date/Time	Operator Initials
Add in order, with mixing					
Resin A	1000 Lbs.	999 Lbs.	AB345	12/5/97 9.35 AM	
Resin B	500 Lbs.	501 Lbs.	CD678	12/5/97 10.00 AM	
Control temperature of mix. Not to exceed 105º F. Temperature recorded = _____ Initials _____					
Crosslinker	100 Lbs.	100 Lbs.	AC250	12/5/97 10.25 AM	

FILLING INSTRUCTIONS

Containers 250 Gal Tote

Filtering 25 Micron Bag

Labeling Per contract

Paint Mfg Master Sample Record - Product Test Results

Product Code: xxR-yyyyy Product Name: White Basecoat
Manufacturing location: Plant #1

Date	Batch #	Batch Size	Wt/Gallon TM001	% non Volatile TM004	Viscosity TM003	Initials	Remarks
		Gallons	10.50 - 10.70	57 - 61%	30 - 40 Secs		
12/5/97	1X97	1000	10.59	59.6	34		Ok

Paint Mfg Master Sample Record - Certificate of Analysis Ingredients

Certificate of Analysis

Material Name: Filmformer Resin Lot/Batch #: AB345

Material Code: Resin A

Specification Requirements

Property	Min.	Max.	Lot/Batch Result
% Non Volatile (TM004)	57%	61%	58.8%
pH (TM005)	7	7.3	7.2

Certification Signature: _____

Date: _____

F.14 Interim Approval (see I.5.2.2)

Most products will achieve full approval prior to initial use. In cases where full approval cannot be obtained, a "Bulk Material Interim Approval" may be granted. A form is shown on page 83; other forms may be used.

COMPLETION OF THE BULK MATERIAL INTERIM APPROVAL FORM

1. SUPPLIER NAME: Name assigned to Supplier's manufacturing location
2. PRODUCT NAME: Supplier's designated name for the product—as identified in the Customer's Engineering Release Documents
3. SUPPLIER CODE: Code (D.U.N.S. # or equivalent) assigned to the manufacturing location as shown on the Customer's purchase order
4. ENG. SPEC.: Customer's identified Specification through which the product is approved and released
5. MANUF. SITE: Physical address of the manufacturing location as shown on the Customer's purchase order
6. PART #: Customer's Part Number
7. ENG. CHANGE #: Formula Revision Level or number identifying the formula
8. FORMULA DATE: Engineering Release Date of the formula identified in item #7
9. RECEIVED DATE: Customer Use Only
10. RECEIVED BY: Customer Use Only (Customer Representative)
11. SUBMISSION LEVEL: Submission Level (1-5) that Supplier is required to submit to as defined by the Customer
12. EXPIRATION DATE: Date that the Interim Approval expires
13. TRACKING CODE: Customer Use Only
14. RE-SUBMISSION DATE: Date supplier will resubmit for production approval
15. STATUS: For each item, enter appropriate code (NR — Not Required, A — Approved, I — Interim)
16. SPECIFIC QUANTITY OF MATERIAL AUTHORIZED: Utilized when Interim Approval specifies a specific quantity of volume of product
17. PRODUCTION TRIAL AUTHORIZATION: Customer's Engineering Release authorizing the use of the product in the Customer's facility
18. REASON(S) FOR INTERIM APPROVAL: Indicate reason for Interim Request
19. ISSUES TO BE RESOLVED, EXPECTED COMPLETION DATE: For each item marked as "I" in #15, provide explanatory details regarding problem issues and furnish a date for problem resolution
20. ACTIONS TO BE ACCOMPLISHED DURING INTERIM PERIOD, EFFECTIVE DATE: What is being done to ensure defective product is contained, date when the action was implemented and Exit Criteria necessary to end need for continuing the action or its individual elements
21. PROGRESS REVIEW DATE: Update on progress of problem resolution, generally the midpoint from issuance to expiration of the interim period
22. DATE MATERIAL DUE TO PLANT: Date material is due to Customer's site
23. WHAT ACTIONS ARE TAKING PLACE TO ENSURE THAT FUTURE SUBMISSIONS WILL CONFORM TO ALL PPAP REQUIREMENTS BY THE SAMPLE PROMISE DATE? Why won't this happen again?
24. SUPPLIER: Responsible and Authorized Supplier official to ensure compliance to the above mentioned actions and dates
25. PRODUCT ENG.: Product Engineer's signature, printed name, phone number and date
26. MATERIALS ENG.: Material Engineer's signature, printed name, phone number and date
27. QUALITY ENG.: Quality Engineer's signature, printed name, phone number and date
28. INTERIM APPROVAL NUMBER: Customer Use Only.

BULK MATERIAL INTERIM APPROVAL FORM

SUPPLIER NAME: (1) **PRODUCT NAME:** (2)

SUPPLIER CODE: (3) **ENG. SPEC.:** (4)

MANUF. SITE: (5) **PART #:** (6)

ENG. CHANGE #: (7) **FORMULA DATE:** (8)

RECEIVED DATE: (9) **RECEIVED BY:** (10)

SUBMISSION LEVEL: (11) **EXPIRATION DATE:** (12)

TRACKING CODE: (13) **RE-SUBMISSION DATE:** (14)

STATUS: (NR - Not Required, A - Approved, I - Interim) (15)

Design Matrix:____ DFMEA:____ Special Product Characteristics:____ Engineering Approval:____

Control Plans:____ PFMEA:____ Special Process Characteristics:____ Process Flow Diagram:____

Test Results:____ Process Studies:____ Dimensional Results:____ Master Sample:____

Measurement Systems Studies:____ Appearance Approval Report:____

SPECIFIC QUANTITY OF MATERIAL AUTHORIZED (IF APPLICABLE): (16)

PRODUCTION TRIAL AUTHORIZATION #: (17)

REASON(S) FOR INTERIM APPROVAL: (18)

ISSUES TO BE RESOLVED, EXPECTED COMPLETION DATE (CLASSIFY AS ENGINEERING, DESIGN, PROCESS, OR OTHER): (19)

ACTIONS TO BE ACCOMPLISHED DURING INTERIM PERIOD, EFFECTIVE DATE: (20)

PROGRESS REVIEW DATE: (21) **DATE MATERIAL DUE TO PLANT:** (22)

WHAT ACTIONS ARE TAKING PLACE TO ENSURE THAT FUTURE SUBMISSIONS WILL CONFORM TO BULK MATERIAL PPAP REQUIREMENTS BY THE SAMPLE PROMISE DATE? (23)

SUPPLIER (AUTHORIZED SIGNATURE) (24) PHONE:

(PRINT NAME) DATE:

CUSTOMER APPROVALS (as needed): PHONE DATE

PRODUCT ENG. (SIGNATURE) (25)

(PRINT NAME)

MATERIALS ENG. (SIGNATURE) (26)

(PRINT NAME)

QUALITY ENG. (SIGNATURE) (27)

(PRINT NAME)

INTERIM APPROVAL NUMBER: (28)

BULK MATERIAL INTERIM APPROVAL FORM

SUPPLIER NAME: _____ **PRODUCT NAME:** _____

SUPPLIER CODE: _____ **ENG. SPEC.:** _____

MANUF. SITE: _____ **PART #:** _____

ENG. CHANGE #: _____ **FORMULA DATE:** _____

RECEIVED DATE: _____ **RECEIVED BY:** _____

SUBMISSION LEVEL: _____ **EXPIRATION DATE:** _____

TRACKING CODE: _____ **RE-SUBMISSION DATE:** _____

STATUS: (NR - Not **R**equired**, A - A**pproved**, I - I**nterim**)**

Design Matrix: _____ DFMEA: _____ Special Product Characteristics: _____ Engineering Approval: _____

Control Plans: _____ PFMEA: _____ Special Process Characteristics: _____ Process Flow Diagram: _____

Test Results: _____ Process Studies: _____ Dimensional Results: _____ Master Sample: _____

Measurement Systems Studies: _____ Appearance Approval Report: _____

SPECIFIC QUANTITY OF MATERIAL AUTHORIZED (IF APPLICABLE): _____

PRODUCTION TRIAL AUTHORIZATION #: _____

REASON(S) FOR INTERIM APPROVAL: _____

ISSUES TO BE RESOLVED, EXPECTED COMPLETION DATE (CLASSIFY AS ENGINEERING, DESIGN, PROCESS, OR OTHER): _____

ACTIONS TO BE ACCOMPLISHED DURING INTERIM PERIOD, EFFECTIVE DATE:

PROGRESS REVIEW DATE: _____ **DATE MATERIAL DUE TO PLANT:** _____

WHAT ACTIONS ARE TAKING PLACE TO ENSURE THAT FUTURE SUBMISSIONS WILL CONFORM TO BULK MATERIAL PPAP REQUIREMENTS BY THE SAMPLE PROMISE DATE?

SUPPLIER (AUTHORIZED SIGNATURE) _____ PHONE: _____

(PRINT NAME) _____ DATE: _____

CUSTOMER APPROVALS (as needed):	PHONE	DATE
PRODUCT ENG. (SIGNATURE) _____	_____	_____
(PRINT NAME) _____		
MATERIALS ENG. (SIGNATURE) _____	_____	_____
(PRINT NAME) _____		
QUALITY ENG. (SIGNATURE) _____	_____	_____
(PRINT NAME) _____		

INTERIM APPROVAL NUMBER: _____

Appendix G

TIRE INDUSTRY - SPECIFIC REQUIREMENTS

G.1 INTRODUCTION AND APPLICABILITY

A supplier of tires shall comply with the requirements of **PPAP** and use this appendix as guidance for clarification of requirements. These guidelines are based on existing approved practices between the tire supplier and the OEM.

Design tests used by each OEM to select tire construction (technical approval), reduces the need to repeat all tests during **PPAP**. Specific **PPAP** confirmation tests are specified by each OEM.

G.2 GUIDELINES FOR PPAP PROCESS REQUIREMENTS (REFERENCE SECTION I.2)

Significant Production Run (I.2.1)

Unless otherwise specified by the OEM, the size of the production run for the **PPAP** parts is to be determined by the supplier. Current industry practice requires a minimum of 30 tires. The typical development of a new tire design involves multiple builds of a small quantity of tires. Most designs are basic to the supplier's process. For the tire industry, **PPAP** is typically completed with an initial mold or molds, and well in advance of customer requirements for large volume production. **PPAP** is not required for additional molds that are brought on line in the approved production process; however, for additional molds, the supplier's internal certification criteria and documentation are utilized.

The **PPAP** for the tire industry typically is derived from 1 to 8 hours of tire curing from the approved production process as specified in the supplier's control plan. Subsequent parts from duplicate assembly lines for volume production are not required to be represented in the **PPAP** sample, nor are additional **PPAP** submissions required.

The above definition for Significant Production Run applies to subsequent sections of I.2.

Tire industry practice defines tooling as a tire mold. This definition of tooling applies to all sections of **PPAP**.

Part Weight (Mass) (Reference I.2.2.13.1)

The tire industry practice is to weigh a specified number of **PPAP** tires to two (2) significant decimals (xx.xx). The average is reported on the PSW to four (4) decimals (xx.xxxx).

Appearance Approval Report (AAR) (Reference I.2.2.14)

Tires are not an appearance item for the OEMs, consequently the AAR requirement is not applicable.

Material Test Results (Reference I.2.2.8.1)

Testing is applicable only to finished tires and not to raw materials. Tire industry practice does not require chemical, physical or metallurgical testing.

Process Flow Diagrams (Reference I.2.2.5)

Process flow diagrams may be generic for families of similar parts.

Process Failure Mode and Effects Analysis (Reference I.2.2.6)

Tire industry practice is to have a generic process **FMEA** for a family of similar parts.

Design Failure Mode and Effects Analysis (Reference I.2.2.4)

Tire industry practice is to have a generic design **FMEA** for a family of similar parts.

Control Plan (Reference I.2.2.12)

Industry practice is to have control plans for "families" of similar parts. Tire industry practice does not require customer review and approval of control plans unless otherwise specified.

General (Reference I.2.2.9.1)

Tire industry practice is that customers and suppliers have designated uniformity and balance as Special Characteristics.

Measurement System Analysis Studies (Reference I.2.2.10)

In the tire industry, where the testing is destructive in nature, the measurement system analysis studies are limited to the equipment measurement system, rather than product repeatability or reproducibility.

Master Sample (Reference I.2.2.17)

Tire industry practice does not require retention of master sample.

Checking Aids (Reference I.2.2.18)

Checking aids are not required for the tire industry.

G.3 SUBMISSION TO CUSTOMER - LEVELS OF EVIDENCE (REFERENCE I.4)

Retention/Submission Requirements (Reference Table I.4.1)

Records of items submitted (S) and retained (R) are maintained at appropriate locations designated by the supplier.

GLOSSARY

For additional related definitions, Refer to the **Statistical Process Control** reference manual, **Measurement Systems Analysis** reference manual, and **QS-9000, Third Edition.**

ACCREDITED LABORATORY is one that has been reviewed and approved by a nationally-recognized accreditation body [e.g. American Association for Laboratory Accreditation (A2LA) or the Standards Council of Canada (SCC)] for test laboratory accreditation to ISO/IEC Guide 25 or its replacement, or national equivalent.

ACTIVE PART is one currently being supplied to the customer for original equipment or service applications. The part remains active until tooling scrap authorization is given by the appropriate customer activity. For parts with no customer-owned tooling or situations where multiple parts are made from the same tool, written confirmation from the customer Purchasing activity is required to deactivate a part.

> **NOTE:** For bulk material, "active part" refers to the bulk material contracted, not the parts that are subsequently produced from that material.

AGREEMENT - used only for bulk material PPAP herein and refers to a situation where the customer and supplier understand the boundaries of an issue without requiring signatures or records documenting the specifics.

APPEARANCE ITEM is a product that is visible once the vehicle is completed. Certain customers will identify appearance items on the engineering drawings. In these cases, special approval for appearance (color, grain, texture, etc.) is required prior to production part submission.

APPROVED is used in **PPAP** to mean that the parts, materials and/or related documentation or records submitted to, or reviewed by, the customer meet all customer requirements. After full or interim approval, the supplier is authorized to ship product as directed by the customer. For bulk material PPAP **only**: 1) "approval" requires a signature or record of a verbal approval; 2) Any record of verbal approval shall include the date, scope of the approval, the name of the customer representative granting the approval, and the name of the supplier representative involved; 3) The term "customer agreement" does not require signatures or records.

APPROVED DRAWING is an engineering drawing signed by the engineer and released through the customer's system.

APPROVED MATERIALS are materials governed either by industry standard specifications (e.g. SAE, ASTM, DIN, ISO) or by customer specifications.

APPROVED SOURCE LIST is a list of suppliers and sub-suppliers that have been found to be acceptable to the customer. Utilizing product from an approved sub-supplier **does not** relieve the direct supplier of responsibility for the quality of that product.

ATTRIBUTES DATA are qualitative data that can be counted for recording and analysis. Examples include the presence or absence of a required label, the installation of all required fasteners. Attributes data are not acceptable for production part submissions unless variables data cannot be obtained.

BULK MATERIAL is a substance (e.g. non-dimensional solid, liquid, gas) such as adhesives, sealants, chemicals, coatings, fabrics, lubricants, etc. A bulk material may become production material if issued a customer production part number (**PRODUCTION MATERIAL**).

BULK MATERIAL REQUIREMENTS CHECKLIST defines the customer PPAP requirements for bulk material. (See Appendix F).

CAD/CAM MATH DATA is a form of design record by which all dimensional information necessary to define a product is conveyed electronically. When this design record is used, the supplier is responsible for obtaining a drawing to convey results of dimensional inspection.

CALIBRATION is a set of operations which compare values taken from a piece of inspection, measuring and test equipment or a gage to a known standard under specified conditions.

CAPABILITY is the total range of inherent variation in a stable process. (see **Statistical Process Control** reference manual)

CHECKED PRINT is a released engineering drawing with **actual measurement results** recorded by the supplier adjacent to each drawing dimension and other requirements.

CONFORMANCE means that the part or material meets the customer's specifications and requirements.

CONTROL - see **STATISTICAL CONTROL**

CONTROL CHARTS - see **Statistical Process Control** reference manual.

CONTROL PLANS are written descriptions of the system for controlling production parts or bulk materials and processes. They are written by suppliers to address the important characteristics and engineering requirements of the product. Each part must have a Control Plan, but in many cases, "family" Control Plans can apply to a number of parts produced using a common process. Refer to **Advanced Product Quality Planning and Control Plan** reference manual and **QS-9000** Section II for customer-specific requirements.

CRITICAL CHARACTERISTIC: Ford definition: Critical characteristics are those product requirements (dimensions, performance tests) or process parameters that can affect compliance with government regulations or safe vehicle/ product function and which require specific supplier, assembly, shipping, or monitoring and inclusion on Control Plans. Critical characteristics are identified with the inverted delta symbol.

CRITICAL CHARACTERISTIC: GM definition: See Key Product Characteristics.

CUSTOMER is the activity that has contracted to buy the product.

CUSTOMER PRODUCT APPROVAL ACTIVITY is the customer location assigned responsibility for supplier **PPAP** approval.

NOTE: Some customers assign this responsibility geographically, while others use the procuring division.

DESIGN-INTENDED ROBUST RANGE are limits within which parameters may be allowed to vary while still ensuring that a product complies with fitness for use requirements.

DESIGN RECORD is the part drawing, specifications, and/or electronic (CAD) data used to convey information necessary to produce a product.

DOCUMENTATION is material (typically paper or electronic) defining the process to be followed, e.g. quality manual, operator instructions, graphics, pictorials.

ENVIRONMENT is defined as all of the process conditions surrounding or affecting the manufacture and quality of a part or product. Environment will vary for each site, but generally includes: housekeeping, lighting, noise, HVAC, ESD controls, and safety hazards relating to housekeeping. See Production Environment.

FAILURE MODE AND EFFECTS ANALYSIS (FMEA) is systematized technique which identifies and ranks the potential failure modes of a design or manufacturing process in order to prioritize improvement actions. Refer to **Potential Failure Modes and Effects Analysis** reference manual.

FULL APPROVAL used in **PPAP** to indicate that the part or production material meets all customer specifications and requirements. The supplier is therefore authorized to ship production quantities of the part or material subject to releases from the customer scheduling activity.

GAGE REPEATABILITY AND REPRODUCIBILITY (Gage R&R) - Refer to the **Measurement System Analysis** reference manual.

INITIAL PROCESS STUDY is a short-term study conducted to obtain early information on the performance of new or revised processes relative to internal or customer requirements. In many cases, preliminary studies should be conducted at several points in the evolution of new processes (e.g., at the equipment or tooling subcontractor's plant, after installation at the supplier's plant). These studies should be based on as many measurements as possible. When utilizing X-Bar and R charts, at least twenty-five subgroups (minimum of four pieces per subgroup) are required to obtain sufficient data for decision making. When this amount of data is not available, control charts should be started with whatever data is available. (Refer to the **Statistical Process Control** reference manual.)

INITIAL SAMPLE is a term previously used for production part submissions.

INTERIM APPROVAL used in **PPAP** to permit shipment of products for a specified time period or quantity. Since not all customers allow interim approvals, consult your responsible customer product approval activity.

KEY CONTROL CHARACTERISTICS (KCCs) are those process parameters for which variation must be controlled around a target value to ensure that a significant characteristic is maintained at its target value. KCCs require ongoing monitoring per an approved Control Plan and should be considered as candidates for process improvement.

KEY DESIGN CHARACTERISTICS (DaimlerChrysler Corporation) - Toleranced and measurable characteristics of a part, system, and/or assembly which may have an adverse or degrading effect on the function, quality, or reliability of that part or system if an out of tolerance condition occurs. A Shield symbol is used to designate a key design characteristic on components, systems or assemblies that have a safety or regulatory designation. On all other components or systems, the key design characteristics are designated by the Diamond symbol. Good judgment should be used when designating key design characteristics, as some designs have more robustness than others or the manufacturing process may not be susceptible to variation.

KEY PROCESS CHARACTERISTICS (DaimlerChrysler Corporation) - Key Process characteristics are measurable elements of the process used to manufacture or assemble a component or system that have significant impact on the function, quality and/or reliability of that component or system. With a process characteristic, an actual element of the process is measured, as opposed to a Key Design Characteristic where the measurement is taken at the component or assembly.

KEY PRODUCT CHARACTERISTIC (KPC) are those product features that affect subsequent operations, product function, or customer satisfaction. KPCs are established by the customer engineer, quality representative, and supplier personnel from a review of the Design and Process FMEAs and must be included by the supplier in the Control Plan. Any KPCs included in customer-released engineering requirements are provided as a starting point and do not affect the supplier's responsibility to review all aspects of the design, manufacturing process, and customer application and to determine additional KPCs.

LABORATORY is a test facility that may include chemical, metallurgical, dimensional, physical, electrical, reliability testing or test validation.

LABORATORY SCOPE is quality record containing the following:

- the specific tests, evaluations and calibrations a supplier laboratory has the ability and competency to perform
- a list of the equipment which it uses to perform the above
- a list of the methods and standards to which it performs the above.

MARKED PRINT is an engineering drawing modified, signed and dated by the customer engineer (the engineering change number must be included).

MEASUREMENT SYSTEM ANALYSIS STUDIES - Refer to the **Measurement System Analysis** reference manual.

PART SUBMISSION WARRANT is an industry-standard document required for all newly-tooled or revised products in which the supplier confirms that inspections and tests on production parts show conformance to customer requirements.

PERISHABLE TOOLS are drill bits, cutters, inserts, etc. used to produce a product and which are consumed in the process.

PROCESS is a combination of people, equipment, methods, materials, and environment that produces output, a given product or service. A process can involve any aspect of a business.

PROCESS FLOW DIAGRAM depicts the flow of materials through the process, including any rework or repair operations.

PRODUCTION ENVIRONMENT is the manufacturing location within the production site which includes the production tooling, gaging, process, materials, operators, environment, and process settings, e.g. feeds, speeds, cycle times, pressures, temperatures, quoted line rate. Environment is defined as all of the process conditions surrounding or affecting the manufacture and quality of a part or product. Environment will vary for each site, but generally includes: housekeeping, lighting, noise, HVAC, ESD controls, and safety hazards relating to housekeeping.

PRODUCTION MATERIAL is material which has been issued a production part number by the customer and is shipped directly to the customer.

PRODUCTION PART is manufactured at the production site using the production tooling, gaging, process, materials, operators, environment, and process settings, e.g., feeds/speeds/cycle times/pressures/temperatures.

PRODUCTION PART APPROVAL SUBMISSION is based on specified quantities of production parts or production materials taken from the significant production run made with production tooling, processes, and cycle times. These parts or materials submitted for production part approval are to be verified by the supplier as meeting all specified requirements from the design record.

QUALITY INDICES are defined herein as either Cpk or Ppk for purposes of **PPAP**. See the **Statistical Process Control** reference manual.

QUALITY PLANNING is a structured process for defining the methods (i.e., measurements, tests) that will be used in the production of a specific product or family of products (i.e., parts, materials). Quality planning embodies the concepts of defect prevention and continuous improvement as contrasted with defect detection (see **Advanced Product Quality Planning and Control Plan** reference manual).

QUALITY RECORD is documented evidence that the supplier's processes were executed according to the quality system documentation, e.g. test results, internal audit results, calibration data, and which records the results. See **QS-9000**, cl. 4.16.

REGULAR PRODUCTION TOOLING is the tooling with which the manufacturer intends to produce production product.

REJECTED used in **PPAP** to mean that the production part submission and/or documents did not meet the customer's requirements. The supplier must correct the production process and a make a new submission. (Advise the customer's Purchasing activity of the date when corrected parts will be available.) Do not ship production parts until the customer approves the corrected parts. The customer may withhold tooling payments until part approval is obtained.

REMOTE LOCATION is a location at which production processes do not occur, e..g. does not fit the definition given for **Site**, but which support such sites.

REPEATABILITY AND REPRODUCIBILITY (R&R) Refer to **Measurement System Analysis** reference manual.

SAFETY CHARACTERISTICS (DaimlerChrysler Corporation Definition) are specifications which require special manufacturing control to assure compliance with DaimlerChrysler Corporation or government vehicle safety requirements.

SALEABLE PRODUCT - generally refers to the product specified on the contract between the supplier and customer.

SELF-CERTIFYING SUPPLIER - is a supplier that an authorized customer representative has designated as "self-certifying," which means that the supplier submits the PSW (e.g. Level 1 PPAP) to the customer, but the response from the customer is not necessary. This designation is to be documented. The PSW submittal from a self-certifying supplier results in a simultaneous "approval" status by the customer for that submittal, which may not be a "full approval."

SIGNIFICANT PRODUCTION RUN is manufacture of a lot consisting of a minimum of 300 consecutive pieces, or other quantity as agreed to by the customer product approval activity, and from a minimum of one hour of production from the production environment.

SITE is defined as a supplier or subcontractor location at which value-added processes occur. "Site" also includes distributors of parts manufactured by other companies. External locations which only stage material for onward shipment, indirect material suppliers or assembly plants are not included. Providers of bulk or raw materials should contact their procuring division buyer to determine if their material is considered to be production material.

SPECIAL CHARACTERISTICS - see Critical Characteristic or Key Product Characteristic. Reference individual Truck Supplier Quality requirements for their definition. For bulk materials, see Appendix F.

SPECIFICATIONS are engineering requirements for judging the acceptability of a part or bulk material characteristic. For the production part approval process, every feature of the product as identified by engineering specifications must be measured. Actual measurement and test results are required. Specifications should not be confused with control limits which represent "the voice of the process".

STABLE PROCESSES are processes that are in statistical control. Variation in the output of a stable process arises only from common causes. A stable process is predictable. For initial process studies performed prior to production part submission, tests for stability may not be as rigorous as those used for ongoing processes.

SUBCONTRACTORS are defined as providers of production materials, or production or service parts, directly to a supplier to DaimlerChrysler Corporation, Ford, General Motors or other customers requiring this document. Also included are providers of heat treating, painting, plating or other finishing services.

SUPPLIERS are defined as providers of: a) production materials, b) production or service parts, or c) heat treating, plating, painting or other finishing services, directly to DaimlerChrysler Corporation, Ford, or General Motors or other customers requiring this document, e.g. Heavy Truck OEMs.

STATISTICAL CONTROL is the condition of a process from which all special causes of variation have been eliminated and only common causes remain. Statistical control is evidenced on a control chart by the absence of points beyond the control limits and by the absence of any non-random patterns or trends. (**STATISTICAL CONTROL** is a descriptive term for a **STABLE PROCESS.**)

SUBMISSION LEVEL refers to the level of evidence required for production part submission (reference I.4.1 of this document).

TOOL is defined as the portion of process machinery which is specific to a component or sub-assembly. Tools (or tooling) are used in process machinery to transform raw material into a finished part or assembly.

TOOLING MAINTENANCE is the periodic sharpening, polishing, or other servicing of a tool. This maintenance will not significantly affect the dimensions or other characteristics of the product produced by the tool. (contrasts with **TOOLING REFURBISHMENT**)

TOOLING REFURBISHMENT is the major overhaul of a tool. Refurbishment can affect dimensions or other characteristics of the product produced by the tool. Production part approval submission of product made with refurbished tools is required before such product may be shipped to the customer.

VALIDATION is confirmation by examination and provision of objective evidence that the particular requirements for specific intended use are fulfilled.

VARIABLES DATA are quantitative results where measurements are used for analysis. Examples include the diameter of a bearing journal in millimeters, the closing effort of a door in newtons, the concentration of an electrolyte in percent, and the torque of a fastener in newton-meters.

VERIFICATION is confirmation by examination and provision of objective evidence that specified requirements have been fulfilled.

WARRANT - see Part Submission Warrant.