

Introduction to Production Part Approval Process (PPAP)

Production Part Approval Process (PPAP) defines generic requirements for production part approval. The purpose of PPAP is to determine if all of Alto – Shaam’s engineering design records and specification requirements are properly understood by the supplier, and that the manufacturing process has the potential to produce product that will consistently meet these requirements during an actual production run at the quoted quantity.

- **NOTE: Submission Requirements will be provided to the Supplier via the Purchase Order. Unless specified in the Purchase Order, PPAP will not be required.**
- **All PPAP Submission Documentation should be returned via E-Mail to:**
supplierppap@alto-shaam.com
and must be sent in advance of any production shipment.
- **Suppliers are not to ship production orders to Alto-Shaam until notified of PPAP Approval**
- **2 PPAP Sample Parts are required for Level 3 Submission and are to be Identified as “Unapproved PPAP Sample Parts” (See Pages 15 & 17) and must be provided and approved prior to any production shipment.**
- **All forms referenced in this Document can be accessed at:**
<http://supplierportal.alto-shaam.com/>



Supplier Quality Management
Production Part Approval Process

Revision 1

July 18, 2013

Introduction

The Alto – Shaam Purchasing staff has prepared this guide for new and existing suppliers of raw material and components to Alto – Shaam. Its purpose is to define the approval process of new or revised parts, or parts that are from new or significantly revised production methods. As a Supplier, it is your responsibility to ensure that you ship only parts that have been approved and meet Alto – Shaam specifications.

If you have questions regarding the contents or processes described in this guide, please contact the Supplier Development Engineer representative of Alto – Shaam at 1-800-558-8744.

For further information about the contents of this guide, please refer to the Automotive Industry Action Groups (AIAG) Production Part Approval Process (PPAP).

Production Part Approval Process (PPAP)

Purpose

The purpose of the Production Part Approval Process (PPAP) is:

- ✓ To provide evidence that all Alto – Shaam engineering design records and specification requirements are properly understood and fulfilled by the supplying organization.
- ✓ To demonstrate that the established manufacturing process produces product that consistently meets all requirements during an actual production run.

When is PPAP Submission Required?

In general PPAP is required anytime a new part or a change to an existing part or process is being implemented. It is at the discretion of Alto – Shaam to determine whether PPAP will be required.

As a supplier to Alto – Shaam your quality system should be capable of meeting the requirements of the PPAP submission regardless of whether you have been asked for a submission.

Alto – Shaam reserves the right to request a PPAP submission for a variety of reasons including:

1. New Part
2. New Supplier
3. Engineering Change
4. New Process
5. New or Change to supplier manufacturing location
6. New or modified Tools
7. Material change

Elements of Alto – Shaam PPAP Submission

Alto – Shaam’s PPAP submission requirements are a sub-set of the existing AIAG standard. One or more of the following may be required as part of the submission, depending upon the assigned submission level.

1. Part Submission Warrant (Alto – Shaam Part Submission Form only)
2. Design Records (& Bubbled Drawings)
3. Process Flow Diagram
4. Process Failure Mode & Effects Analysis
5. Control Plan
6. Dimensional Results (Alto – Shaam format or equivalent)
7. Records of Material/Performance Test Results
8. Initial Process Studies
9. Sample Production Parts

Alto – Shaam has forms available at: <http://supplierportal.alto-shaam.com/> . You can use those or any AIAG compliant form with the exception of Element 1, Part Submission Warrant.

Submission Levels

Submission Levels define which elements are required to be submitted. The levels are used for different reasons and applications and are defined by Alto – Shaam. There are three submission levels. The Level of submission required will be communicated via the Purchase Order:

- Level 1** Part Submission Warrant only.
- Level 2** Part Submission Warrant with limited supporting documentation.
- Level 3** Part Submission Warrant with product samples and complete supporting documentation.

Regardless of Submission Level, all PPAP submissions must be sent in advance of any production shipments.

As specified by the Purchase Order, a PPAP submission will be required for each Part Number.

Submission Requirements Quick Reference Guide

Alto – Shaam has a Quick Reference Guide that can be used for referencing and organizing a PPAP submission. The Reference Guide lists all of the required elements for each Submission Level, 1 through 3.

Element Order	PPAP Requirements Reference AIAG PPAP Fourth Edition Important: Submit your documents in this order	Level 1	Level 2	Level 3	Required Documents	Additional Comments
1	Part Submission Warrant	S	S	S	Alto - Shaam Part Submission Form only	Alto - Shaam PSW is required for all submissions and is required for all Alto - Shaam designed parts.
2	Design Records & Bubbled part print(s)	N/A	S	S	Alto - Shaam Part Print	Include one clean copy of the current approved revision print with all dimensions, applicable specifications, and notes, bubbled (circled with corresponding number) on the print for reference to the dimensional report.
3	Process Flow Diagram	N/A	N/A	S	Any Standard flowchart format	Identifies all process steps from receiving to shipping. Process steps must match PFMEA and Control Plan steps.
4	Process Failure Mode & Effects Analysis (PFMEA)	N/A	N/A	S	Can be Alto - Shaam supplied format or an AIAG compliant PFMEA.	Process steps must match Process Flow Chart, Control Plan and address all characteristics associate with each operation. Risk Priority Numbers must be identified with critical processes and inspections identified.
5	Control Plan	N/A	N/A	S	Can be Alto - Shaam supplied format or an AIAG compliant Control Plan.	Control Plan must match the Flow Chart and PFMEA process steps and describe the actions of each phase of the manufacturing process from receiving to shipping. All Critical Characteristics must be addressed within the corresponding process step. Any dedicated check/testing fixtures that are used will be identified along with the numbered characteristic it measures/tests on the print
6	Dimensional Results	N/A	S	S	Can be Alto - Shaam supplied format or similar.	Include all characteristics on the print. Report results should correspond to the "Bubbled" dimensions of the Print and be reported in the same scale as the Print. Results of 3 parts is required (if parts are from a Multi-Cavity tool, report results for 1 piece per cavity, and note cavity).
7	Records of Material / Performance Test Results	N/A	S	S	Industry Standard Reports	Certificates of Analysis for all primary raw materials such as steel, rubber, chemicals, and plastic resins. Performance life testing results, such as Salt Spray, heat, electrical performance, when required by Print or Specification.
8	Initial Process Studies	N/A	*	*	Capability Study using any statistical package or Alto - Shaam supplied format.	A short term study of process capability must come from a significant production run. For Critical Characteristics a minimum Cpk value of 1.33 is required. For Multi-cavity tools, a separate study is required for each cavity.
9	Sample Production Parts	N/A	N/A	S	Parts Tagged "PPAP Samples"	2 sample parts with every submission unless otherwise requested. Multi-cavity tools require 1 part per cavity.

S = Submission to Alto – Shaam Required

Electronic Submission

Alto – Shaam prefers that all PPAP submissions be submitted electronically via e-mail to:

supplierppap@alto-shaam.com

It is preferred that the PPAP be 1 PDF file for the entire submission.

Significant Production Run

PPAP data is generally submitted from a “significant production run”, sampled randomly.

- **Sampling should be taken from a representative production run, utilizing production equipment, tooling and production employees.**

The intent is that all data reflects the **actual production process** to be used during production.

Submission Status

The review and approval of the PPAP submission will be managed by Alto – Shaam. Submissions will be reviewed and dispositioned with one of the following statuses:

Approved: Acceptance of the PPAP submission within the specified guidelines set forth by Alto – Shaam.

Rejected: The PPAP submission does not meet the specified guidelines and must be resubmitted for approval.

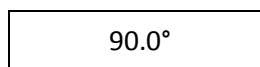
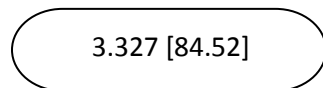
Interim Approval: An interim approval may be given through an agreement with Alto – Shaam engineering, and the product must not affect final product quality. Interim approval is limited to a defined number of days or quantity, and a corrective action plan must be identified to achieve full approval.

Critical To Quality (CTQ)

Critical To Quality characteristics are defined as:

- A critical part requirement specified on the engineering document, typically a drawing, specification or performance requirement.
- A critical process requirement that is identified by Alto – Shaam, i.e. Welding.

Critical Characteristics are features that have greater significance and most affect the outcome of a product or process. Alto – Shaam expects suppliers to address all CTQ’s in the Control Plan and that robust process controls are in place to ensure product conformance. Control may require the supplier to perform capability studies or implement Poke – Yoke (mistake proofing) techniques. Alto – Shaam will identify CTQ’s in one of two manners. Either an Oblong or Rectangle will bound a feature of the design record.



Instructions for completing a PPAP Submission

All submissions must be submitted no later than the PPAP Due Date indicated on the Purchase Order.

All Submissions should be sent via E-Mail to: supplierppap@alto-shaam.com

Element 1- Part Submission Warrant (PSW)

The purpose of the Part Submission Warrant is to document the submission and the approval or rejection of purchased parts prior to production.

Alto – Shaam has developed its own Submission Warrant document and this form is a required element of the PPAP submission. It must be submitted as part of the PPAP and is required for every Level, 1, 2, or 3.

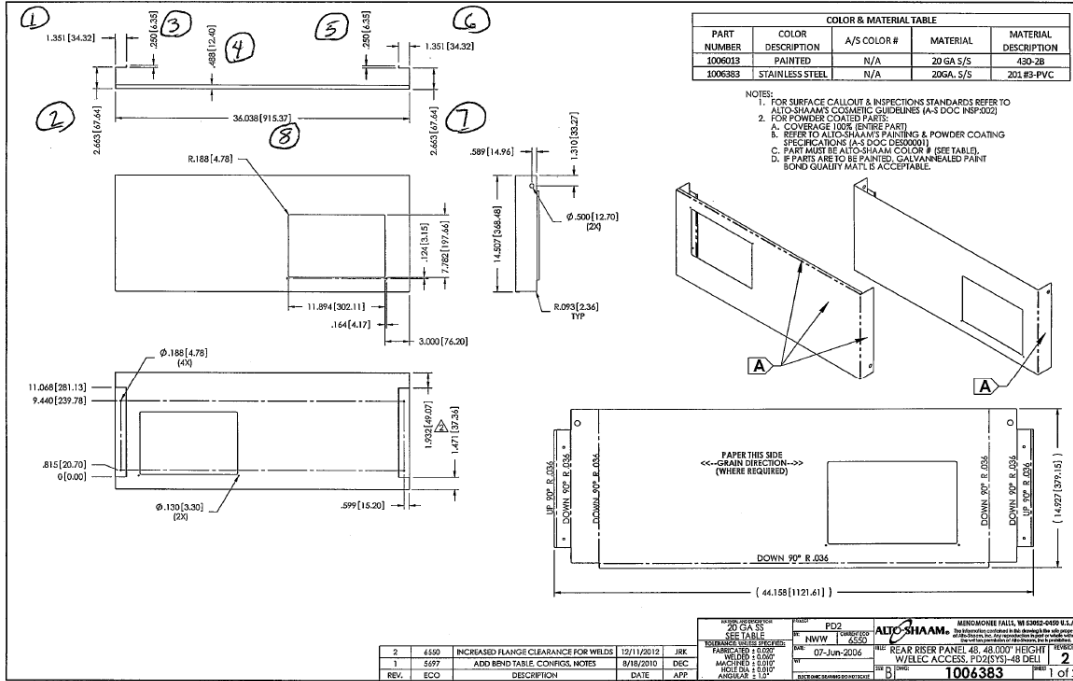
The form must be submitted with the correct Part Number, Revision Level and to the proper Submission level. It is critical to make sure the Warrant is filled out correctly, and contains accurate and legible information.

ALTO-SHAAM		ALTO - SHAAM PART SUBMISSION WARRANT			Required Submission Level	
Reason for Submission				<input type="radio"/>	Level 1	LOT SIZE
<input type="checkbox"/> Initial Submission	<input type="checkbox"/> Engineering Change	<input type="checkbox"/> Tooling Transfer, Replacement, Refurbishment		<input type="radio"/>	Level 2	
<input type="checkbox"/> Correction of Discrepancy	<input type="checkbox"/> Change in Part Processing	<input type="checkbox"/> Supplier Source Change		<input type="radio"/>	Level 3	
				Date Required		
Alto - Shaam Part Number and Supplier Part Number	Rev Level	Manufacturing Process	Supplier Name		Supplier Contact, Person Completing this Form	
Part Name	P.O. Number	Address		E-mail		
Alto - Shaam Address	Alto - Shaam Buyer	City		Zip Code		
P.O. Box 450		State/Province				
W164 N9221 Water Street	Phone Number	Country of Origin				
Monomonee Falls, WI 53052-0450		Phone Number				
Submission Requirements				OTHER COMMENTS		
Requirement	Level 1	Level 2	Level 3			
1 Part Submission Warrant	S	S	S			
2 Design Record	N/A	S	S			
All Current Level Drawings (Top and Subordinate)		S	S			
Other Relevant Specifications (as Required)		S	S			
3 Process Flow Diagram	N/A	R	S			
4 Process Failure Mode & Effects Analysis	N/A	R	S			
5 Control Plan	N/A	R	S			
6 Dimensional Results (3 Per Part Number/1 Per Tool Cavity)	N/A	S	S			
7 Records of Material/Performance Test Results	N/A	S	S			
8 Initial Process Studies (for all Special Characteristics)	N/A	*	*			
9 Sample Production Parts (identified as PPAP Samples)	N/A	N/A	S			
R = Supplier shall retain and make available to A-S upon Request. S = Supplier shall submit to A-S and retain a copy of records. *Supplier shall retain, and submit to A-S upon Request.						
Submission Results						
These Results meet all design record requirements <input type="radio"/> Yes <input type="radio"/> No (If No, Explanation Required)						
I affirm that the samples represented by this Warrant are from a significant production run, and are representative of our production process, utilizing production tooling, gaging, processes, and production operators.						
Supplier Authorized Signature _____		Print Name _____		Title _____		
Date _____						
Alto - Shaam Use Only						
PPAP Warrant Disposition	<input type="radio"/> Approved	<input type="radio"/> Rejected	<input type="radio"/> Interim Approval	Authorization _____		
Signature _____	Print Name _____		Date _____			

Element 2 Design Records and “Bubbled” Drawings

The purpose of the Design Record and Bubbled Drawings is to document and provide a copy of the part print and any other additional engineering records.

Example of a Bubbled Drawing (see below)



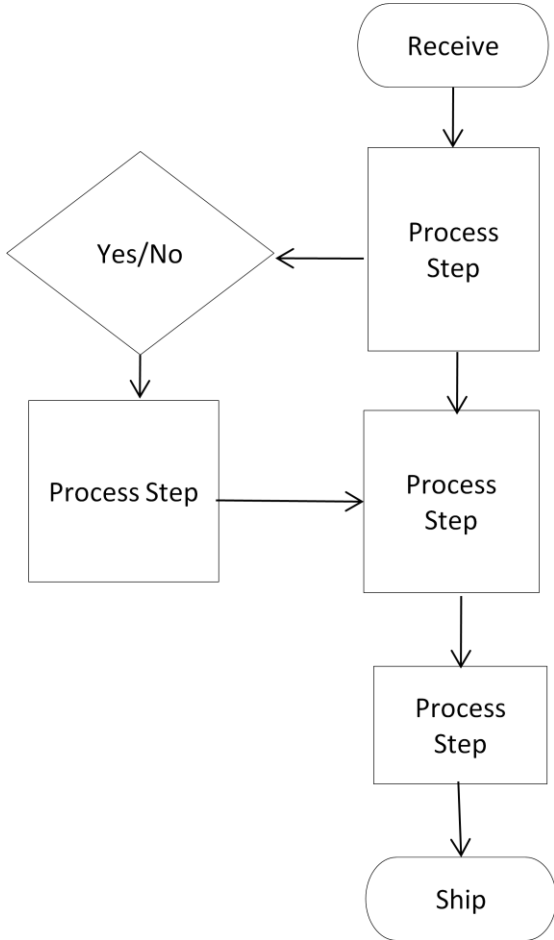
A bubbled drawing shows the parts in a part print with numbered “bubbles” that point to individual dimensions and requirements of the part. The numbers on the bubbled drawing correspond to the numbers found on the Dimensional Results form.

SUPPLIER:					PART NUMBER:					
NAME OF TECHNICIAN PERFORMING MEASUREMENTS					PART NAME:					
					ENGINEERING CHANGE LEVEL					
ITEM	DIMENSION/SPECIFICATION	SPECIFICATION / LIMITS	MEASUREMENT TECHNIQUE (Gage)	TEST DATE	QTY TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NOT OK

All Part requirements on the print must be bubbled and numbered for reference and measurement, and may include: Dimensions, electrical requirements, visual features (color, finish, etc).

Element 3 Process Flow Diagram

The purpose of the Process Flow Diagram is to document the steps required in the manufacturing of the part. The Main process steps must match both the Process Failure Mode & Effects Analysis, and the Control Plan. The Process Flow should include the entire process, from Receiving through Shipping.



The Process Flow Diagram must include all key steps of the process and include activities, such as, Inspection, Measurement, Scrap, and disposition of Non-Conforming material.

Element 4 Process Failure Mode & Effects Analysis (PFMEA)

The Process FMEA (PFMEA) is used to show evidence that any potential failures and risks have been evaluated for the manufacturing process. PFMEA's can be submitted using the Alto – Shaam form or similar.

A PFMEA should be performed for every part, or process involved in manufacturing. The PFMEA should be developed in a Cross Functional manner, involving participation from engineering, quality, purchasing, etc.

The PFMEA worksheet is used as a tool to identify and show potential process risks (or what could go wrong) with the manufacture of each part. It also indicates the controls with each process. All high Risk Priority Numbers (RPN) resulting from the PFMEA should be carried over to the Control Plan.

Sample of PFMEA form below

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)																	
PART NUMBER												FMEA #					
TEAM MEMBERS												REVISION #					
APPROVED BY												DATE					
PROCESS FUNCTION	POTENTIAL FAILURE MODE	POTENTIAL EFFECT OF FAILURE	S E V E R I T Y	C L A S S	POTENTIAL CAUSE OF FAILURE	O C C U R	CURRENT PROCESS CONTROL	D E T E C T	RISK PRIORITY NUMBER	RECOMMENDED ACTION	RESPONSIBILITY & TARGET COMPLETION DATE	ACTION RESULTS					
												ACTION(S) TAKEN	S E V E R I T Y	O C C U R	D E T E C T	RISK PRIORITY NUMBER	

Sample of steps of the PFMEA

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)																	
PART NUMBER		5011234										FMEA #		001			
TEAM MEMBERS		John Doe, Mary Smith, Donald Brown, Sam Jones										REVISION #		A			
APPROVED BY		Sam Jones										DATE		1/5/2013			
PROCESS FUNCTION	PROCESS FUNCTION	POTENTIAL FAILURE MODE	POTENTIAL EFFECT OF FAILURE	S E V E R I T Y	C L A S S	POTENTIAL CAUSE OF FAILURE	O C C U R	CURRENT PROCESS CONTROL	D E T E C T	RISK PRIORITY NUMBER	RECOMMENDED ACTION	RESPONSIBILITY & TARGET COMPLETION DATE	ACTION RESULTS				
													ACTION(S) TAKEN	S E V E R I T Y	O C C U R	D E T E C T	RISK PRIORITY NUMBER
010	Receive Incoming material	material does not meet specification	failure of corrosion test	7		Supplier sent wrong material	2	material certifications with each shipment	6	84	none						
020	machining	oversized diameter	part fails to fit or mate	8		wrong tool used wrong program entered improper use of gage out of calibration	2	first piece inspection first piece inspection operator training calibration procedure	3	48	Automatic Tool retrieval system	Bill White 02/28/13	Add last piece inspection and keep final piece with Tool	8	1	1	8
030	blanking					tool wear											

PFMEA: Severity, Occurrence and Detection Ranks

Severity is an assessment of the seriousness of the failure.

Effect	Criteria	Rank
None	No effect on reliability or safety	1
Minor	Very minor, no damage, no injuries, requires only maintenance	2 – 3
Minor	Low damage, possible light injuries, noticed by average customer	4 – 5
Moderate	Moderate damage, injuries possible, most customers are annoyed	6 -7
Critical	Causes loss of primary function, severe damage, severe injuries	8 – 9
Catastrophic	Product becomes inoperable, may result in complete unsafe operation	10

Occurrence is an assessment of how frequently the failure is likely to occur.

Probability to Occur	Rank
Failure is extremely unlikely, virtually impossible, no known occurrences on similar products	1 – 2
Relatively few failures, remote chance of occurring	3 – 4
Occasional failures, known to occur in similar parts or processes	5 – 6
Repeated failures, reasonable to expect failure(s) will occur	7 – 8
Failure almost inevitable, fails frequently	9 - 10

Detection is an assessment that the current control in place will detect a potential cause of the failure.

Detection	Criteria	Rank
Almost Certain	Current control(s) almost certainly will detect the failure	1 - 2
High/Very High	Very high likelihood that current control will detect failure	3 – 4
Moderately High	Moderately high likelihood that control(s) will detect failure	5 – 6
Low	Very unlikely failure will be detected with current control(s)	7 - 8
Almost impossible	No known or current technology available to detect failure	9 - 10

Element 5 Control Plan

A Control Plan describes the operations, processes, equipment, materials, etc, that are used for controlling the manufacturing of the part. The control plan must address all CTQs (Critical to Quality), and clearly identify all primary steps of the manufacturing process.

Completing the control plan should be a fairly straightforward process, where the supplier simply documents the processes involved in the manufacturing process from start to finish. The Process Flow Diagram, PFMEA, and bubbled drawing provide inputs to the Control Plan. **All CTQs must be addressed on the Control Plan.**

A Control Plan should address the test, inspection and measurement methods used in making a quality product.

Control Plans can be submitted using the Alto – Shaam form or similar.

Sample of Control Plan form.

CONTROL PLAN										
Part Number			Rev:		Key Contact:			Date (Orig):		
<input checked="" type="checkbox"/> Production Control Plan					Phone #:			Date (Rev):		
					Fax #:					
Description:					Core Team					
Supplier:										
Part/ Process No.	Process Name/Operation Description	Machine/ Device/ Jig/ Tools for Mfg.	Characteristics		Critical to Quality (CTQ)	Methods			Reaction Plan	
			Product	Process		Product/ Measurement	Sample	Control		
						Size	Frq			
Part Number		Enter the part number being controlled. When applicable, enter the latest engineering revision.								
Description		Enter the name and description of the part or process being controlled.								
Supplier		Enter name of company providing and preparing the plan.								
Key Contact/Phone		Enter the name and phone number of the primary contact responsible for completing the control plan.								
Core Team		Enter the name(s) and phone number(s) of the individual(s) responsible for preparing the control plan.								
Date (Orig)		Enter the date the control plan was first created.								
Date (Rev)		Enter the date of the latest revision to the control plan								
Part / Process No.		This item usually corresponds and is referenced from the Process Flow Chart.								
Process Name / Operation Description		Identify the process/operation name from the flow diagram that best describes the activity being addressed.								
Machine/Device/Jig/Tools for Mfg.		For each process described, identify the equipment, e.g. machine, fixtures, or other tools for manufacturing.								
CHARACTERISTICS										
Product		Features or properties of a part that are described on drawings or other engineering information.								
Process		Are the process variables that have a cause and effect relationship with the Product characteristic.								
Special Characteristic		Are uniquely identified by Alto - Shamm on drawings (bounded by "Obround"), that may significantly affect safety, function, fit or appearance.								
METHODS										
Product/Process Spec/Tolerance		Product / Process specifications and tolerances that are obtained from various engineering documents, e.g. drawings.								
Measurement Technique		Describes the measurement technique being used; could include gages, fixtures, tools or other test equipment required to								
Sample Size / Frequency		When sampling is required, list the sample size and frequency.								
Control Method		a brief description describing how the operation will be controlled, including inspection methods, e.g. 100% inspection, visual, etc.								
Reaction Plan		Specifies the corrective actions necessary to avoid producing nonconforming product, e.g. notify supervisor, adjust and re-check, etc.								

Element 6 Dimensional Results

The Dimensional Results are documented in the Dimensional Data Sheet. The measurements on this form should correspond to the “Bubbled” drawing used in Element 2, Design Records and “Bubbled” Drawings.

The intent is to demonstrate conformance to all Alto – Shaam part print dimensions and any other print requirements.

Non-Dimensional requirements should be addressed in the PPAP section, Records of Material / Performance Test Results.

Alto – Shaam requires a full dimensional layout of a minimum of 2 parts (or 1 part per Tool Cavity) for Level 2 and 3.

The Parts measured for Element 6 should be the same parts as those submitted as PPAP Samples, Element 9.

Dimensional Data Sheet										
SUPPLIER:							PART NUMBER:			
							PART NAME:			
NAME OF TECHNICIAN PERFORMING MEASUREMENTS							ENGINEERING CHANGE LEVEL			
ITEM	DIMENSION/SPECIFICATION	SPECIFICATION / LIMITS	MEASUREMENT TECHNIQUE (Gage)	TEST DATE	QTY TESTED	ORGANIZATION MEASUREMENT RESULTS (DATA)			OK	NOT OK

Any dimension failing to meet the specified requirement will be cause for an unacceptable condition. Failure to meet the specified requirement may result in Corrective Action being identified and addressed.

Element 7 Records of Material / Performance Test Results

Material / Performance Test Results is a broad category for all other test results that are not dimensional.

Material Test Results should be provided in the form of a Certificate of Analysis (or Certificate of Compliance, though not preferred).

Performance Tests should meet the specific test(s) required, i.e. electrical, and show evidence of conformance.

Element 8 Initial Process Studies (for all CTQs)

The purpose of the initial process study is to determine whether the process is likely to produce product that will meet Alto – Shaam requirements.

Initial Process Studies are required for all CTQs.

A minimum of 10 consecutive pieces from an actual production run is required to perform an initial capability study.

Element 9 Sample Production Parts (identified as PPAP Samples)

Sample Parts are to be included and must be actual samples measured in the Dimensional Report, Element 6.

Sample parts should be delivered prior to or with the PPAP submission.

The supplier is required to submit 2 pieces unless otherwise specified.

Sample Parts must be to the current Revision and be from an actual production run.

Each Sample Part must be properly identified, including Part Number, Revision, Supplier Name and the Number of the Sample corresponding to the measurement data of the Dimensional Report. **The PPAP Samples must be clearly identified as “Unapproved PPAP Sample Parts”**

MINI CAPABILITY POTENTIAL

Date _____

Machine _____ Part Number _____

Performed By _____

Nominal Measurement _____ Tolerance _____

Upper Spec Limit (USL) _____ Lower Spec Limit (LSL) _____

MEASUREMENTS

1. _____ 2. _____ 3. _____

4. _____ 5. _____ 6. _____

7. _____ 8. _____ 9. _____

10. _____ NOTES _____

$$\bar{X} = \sum X / 10 = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$R = \text{Highest} - \text{Lowest} = \underline{\hspace{2cm}} - \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$6\sigma = 2 * R = 2 * \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$3\sigma = R = \underline{\hspace{2cm}}$$

Capability Potential

$$C_p = (USL - LSL) / 6\sigma = (\underline{\hspace{2cm}} - \underline{\hspace{2cm}}) / \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$C_{pk} = (USL - \bar{X}) / 3\sigma \text{ or } (\bar{X} - LSL) / 3\sigma \text{ (use smallest)}$$

$$= \underline{\hspace{2cm}} - \underline{\hspace{2cm}} / 3\sigma = \underline{\hspace{2cm}} \quad \text{OR}$$

$$= \underline{\hspace{2cm}} - \underline{\hspace{2cm}} / 3\sigma = \underline{\hspace{2cm}}$$



Sample # _____

**UNAPPROVED
SAMPLE PPAP PARTS**

**NOT INTENDED FOR
PRODUCTION USE**

Supplier Name _____