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.

- **All Supplier Product / Process Changes must be submitted for Alto-Shaam approval using F-455: Product/Process Change Notification and approved prior to any change occurring (See page 15).**

- **Suppliers are not to ship production orders to Alto-Shaam until notified of PPAP Approval**

- **PPAPs in which Sample Parts are required, a quantity of 2 PPAP Sample Parts, unless otherwise specified, are required for submission and are to be Identified as "Unapproved PPAP Sample Parts" using yellow 8-1/2" X 11" paper (See Pages 12 & 14) 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 4

February 1, 2021

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 in 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 subset 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. Production Control Plan (Alto-Shaam format or equivalent)
4. Dimensional Results (Alto – Shaam format or equivalent)
5. Material Certifications and Test Results (Performance, Durability)(Alto-Shaam format or equivalent)
6. Initial Process Capability Studies
7. Sample Production Parts
8. Measurement System Analysis (Alto-Shaam format or equivalent)

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.

Element Submission Requirements

Submission requirements are determined based on Part Risk, Safety requirements, New Part or Product classification, and Technology and identifies which elements are required to be submitted or retained per PPAP request. The Supplier Risk, Part Risk, Safety requirements, New Part or Product classification, and Technology are used for different reasons and applications, and are defined by Alto – Shaam. Generally speaking, off-the-shelf parts require Level 1, custom parts Level 2, and complicated high risk parts Level 3.

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 may be used for referencing and organizing a PPAP submission. The Reference Guide lists all of the elements for possible submission.

ALTO-SHAAM *PPAP Production Part Approval Process* — ***Submission Requirements Quick Reference Guide***

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	Warrant	S	S	S	Alto - Shaam Part Submission Form only	PSW is required for all submissions and is required for all Alto - Shaam designed parts.
2	Design Records & Bubbled part print(s)	R	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	Control Plan	R	R	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
4	Dimensional Results Supplier	R	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-Cavitiy tool, report results for 1 piece per cavity, and note cavity).
5	Material Certificates / Performance Test Results	R	*	*	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.
6	Initial Process Studies	R	*	*	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.
7	Sample Production Parts	R	S	S	Parts Tagged "PPAP Samples"	2 sample parts with every submission unless otherwise requested. Multi-cavity tools require 1 part per cavity.
8	Measurement System Analysis (MSA)	Special Request			Measurement System Analysis (MSA)	When measuring parts is critical, see tab 10

S = Supplier shall submit to A-S and retain a copy of records; * Only required for initial submission; R = Supplier shall retain records and submit to A-S upon request

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 an Excel .XLS file for the entire submission, but Adobe .PDF is acceptable.

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.

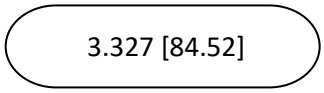
Interim Approval: An interim approval may be given through an agreement with Alto – Shaam engineering, and the product must be not affect final product quality. Interim approval is limited to a defined number of days or quantity, and a corrective action plan must be identified to achieve full approval.

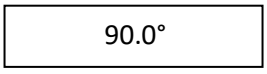
Critical To Quality (CTQ)

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.

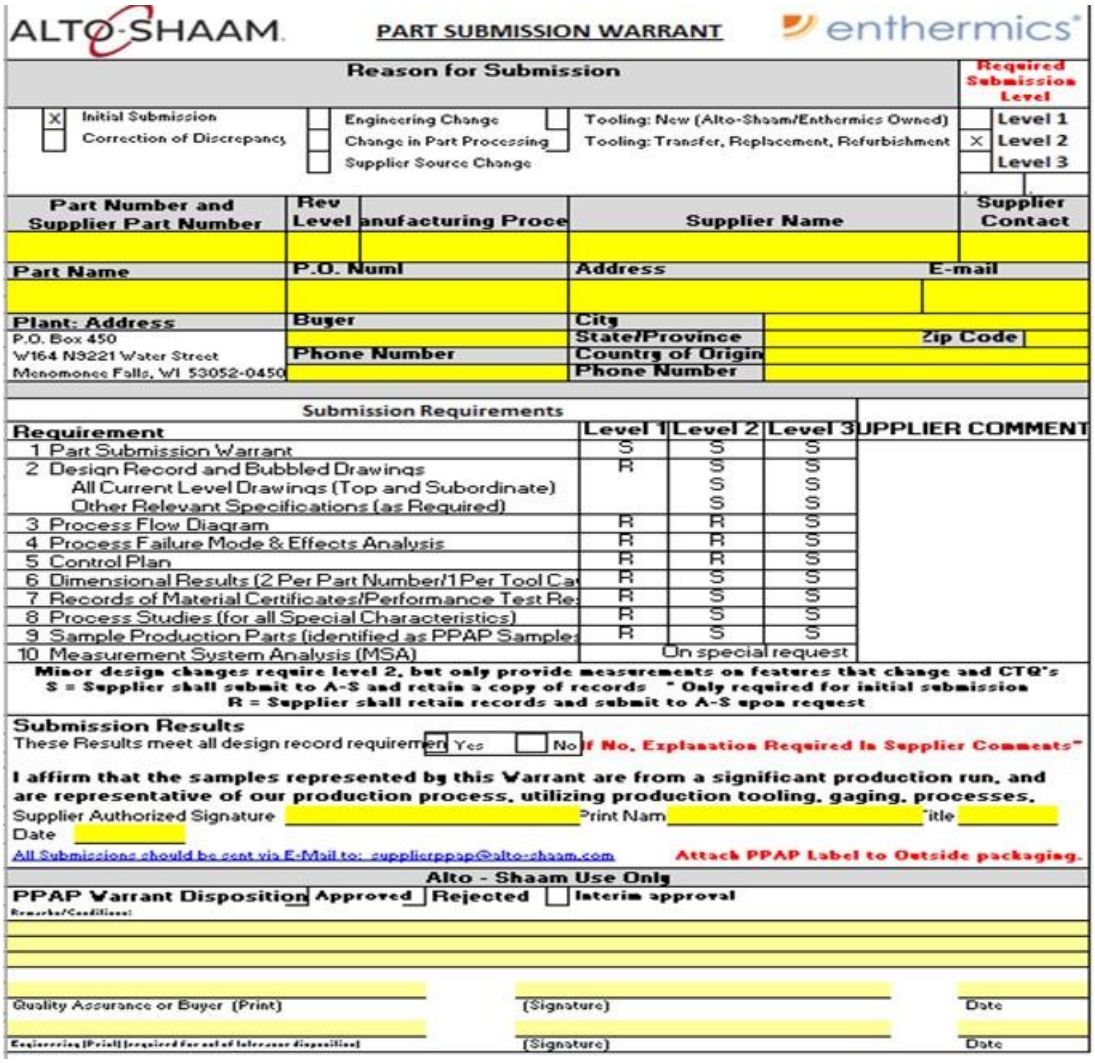
All Submissions should be sent via e-mail to: supplierppap@alto-shaam.com

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 PPAP.

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



ALTO-SHAAM PART SUBMISSION WARRANT enthermics

Reason for Submission			Required Submission Level
[X] Initial Submission [ ] Correction of Discrepancy	[ ] Engineering Change [ ] Change in Part Processing [ ] Supplier Source Change	[ ] Tooling: New (Alto-Shaam/Enthermics Owned) [ ] Tooling: Transfer, Replacement, Refurbishment	[ ] Level 1 [X] Level 2 [ ] Level 3

Part Number and Supplier Part Number	Rev Level	anufacturing Proce	Supplier Name	Supplier Contact

Part Name	P.O. Numl	Address	E-mail

Plant: Address	Buyer	City	
P.O. Box 450 W164 N9221 Water Street Menomonee Falls, WI 53052-0450		State/Province	Zip Code
	Phone Number	Country of Origin	
		Phone Number	

Submission Requirements				
Requirement	Level 1	Level 2	Level 3	SUPPLIER COMMENT
1 Part Submission Warrant	S	S	S	
2 Design Record and Bubbled Drawings	R	S	S	
All Current Level Drawings (Top and Subordinate)		S	S	
Other Relevant Specifications (as Required)		S	S	
3 Process Flow Diagram	R	R	S	
4 Process Failure Mode & Effects Analysis	R	R	S	
5 Control Plan	R	R	S	
6 Dimensional Results (2 Per Part Number/1 Per Tool Ca	R	S	S	
7 Records of Material Certificates/Performance Test Re	R	S	S	
8 Process Studies (for all Special Characteristics)	R	S	S	
9 Sample Production Parts (identified as PPAP Samples	R	S	S	
10 Measurement System Analysis (MSA)	On special request			

Minor design changes require level 2, but only provide measurements on features that change and CTQ's
S = Supplier shall submit to A-S and retain a copy of records " Only required for initial submission
R = Supplier shall retain records and submit to A-S upon request

Submission Results
These Results meet all design record requirem [ ] Yes [ ] No **If No, Explanation Required In Supplier Comments"**

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,
Supplier Authorized Signature Print Nam Title
Date
All Submissions should be sent via E-Mail to: supplierppap@alto-shaam.com **Attach PPAP Label to Outside packaging.**

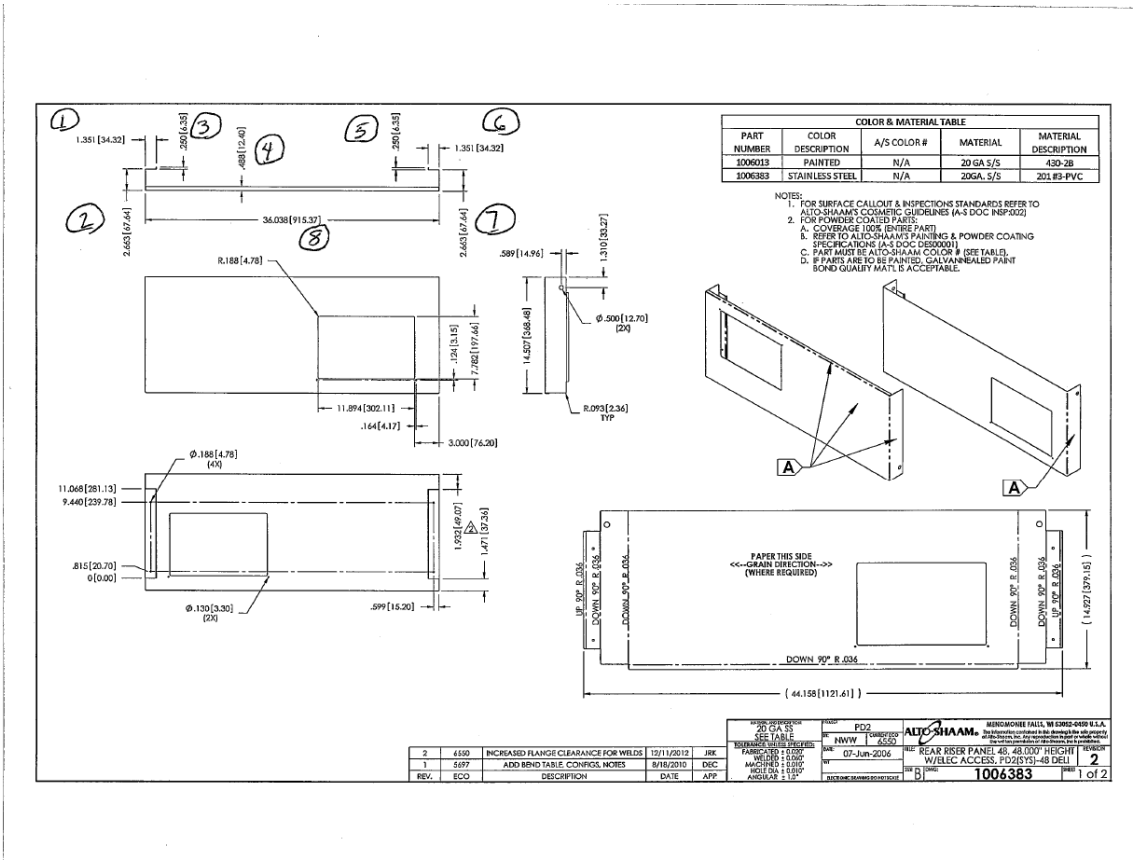
Alto - Shaam Use Only
PPAP Warrant Disposition [ ] **Approved** [ ] **Rejected** [ ] **Interim approval**
Remarks/Conditions:

Quality Assurance or Buyer (Print) (Signature) Date
Engineering (Print) (required for all of Interest dispositions) (Signature) 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.

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 Production 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 straightforward process, where the supplier simply documents the processes involved in the manufacturing process from start to finish. A Process Flow Diagram, PFMEA, and the 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

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

Or submitted with PPAP Sample Parts, clearly marked on Packaging.

Part Number _____ Rev. _____	Key Contact: _____	Date (Orig): _____
[X] 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 Spec/Tolerence	Measurement Technique	Sample		Control Method	
			Product	Process			Size	Frq			

Element 4 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 1, 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 sections, Material Certifications and/or Test Results (Performance, Durability).

Alto – Shaam requires a full dimensional layout of a minimum of 2 parts (or 1 part per Tool Cavity) for submissions requiring the Dimensional Results element.

The Parts measured for Element 4 should be the same parts as those submitted as PPAP Samples, Element 7.

Dimensional Results (Variable & Attribute) - to be filled by Supplier (example on line 6, 7 and 8)															
Part #:	0				Revision:		0								
Part Name:	0				Inspector name and title:							Inspection Date:			
Item No.	Dimensions/Specifications	Nominal Specification	TOL-	TOL+	Lower Spec	Upper Spec	Inspection Results					Method of Inspection	Results meet specif.?		
							1	2	3	4	5		OK	Not OK	Disposition
example: 1	example: length	5	2	2	3.000	7.000	5	7	3	4	8	measuring tape		X	
example: 2	example: length capability	1.33	0.01	0.01	1.320	1.340	1.29	1.3	1.33	1.331	1.329	caliper		X	
example: 3	example: grain direction	Left to Right					Pass	Pass	Pass	Pass	Pass	visual	X		
													X		
													X		
													X		
													X		
													X		
													X		

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

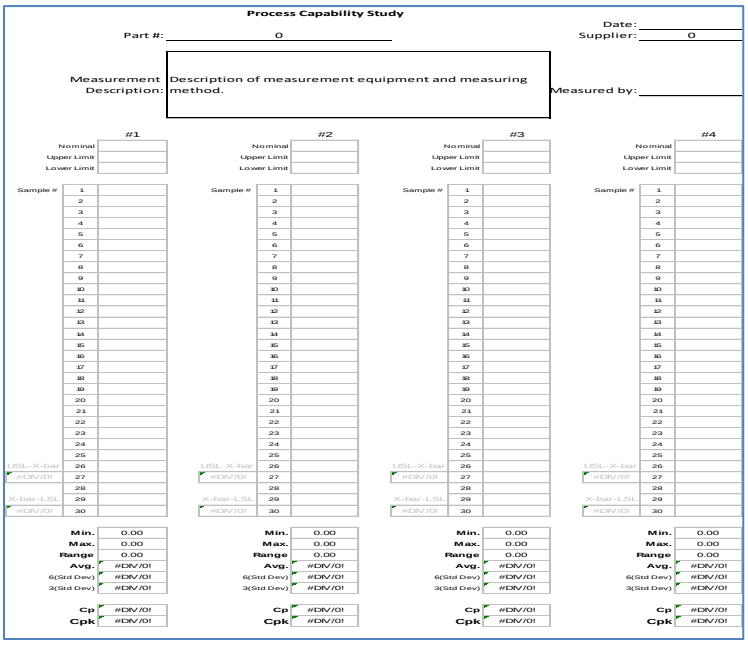
Element 5 Material Certificates and Test Results (Performance, Durability)

Performance Tests should meet the specific test(s) required (e.g., salt spray, electrical, life testing), and show evidence of conformance.

Element 6 Capability Study

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 Capability Studies are required for all CTQs.



Element 7 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 and 7.

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.

SAMPLE # _____

UNAPPROVED PPAP SAMPLE PARTS

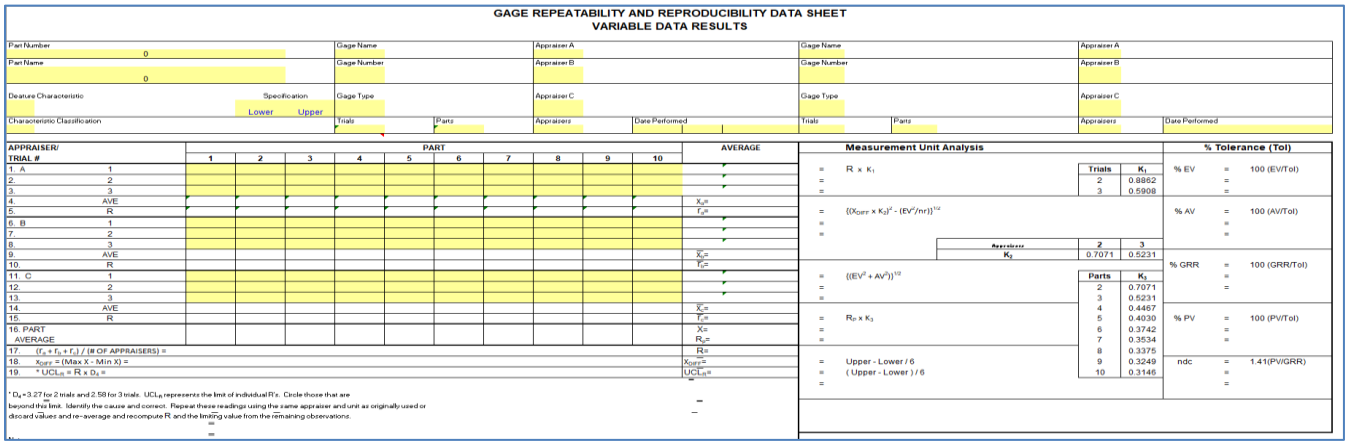
NOT INTENDED FOR PRODUCTION USE

SUPPLIER NAME _____

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"**

Element 8 Measurement Systems Analysis (MSA)

This requirement is necessary upon special request from Alto-Shaam or if supplier believes a measurement is at risk of not being dependable / repeatable.



GAGE REPEATABILITY AND REPRODUCIBILITY DATA SHEET
VARIABLE DATA RESULTS

Part Number	0		Gage Name		Appraiser A		Gage Name		Appraiser A			
Part Name	0		Gage Number		Appraiser B		Gage Number		Appraiser B			
Dearee Characteristic		Specification Lower Upper	Gage Type		Appraiser C		Gage Type		Appraiser C			
Characteristic Classification			Trials	Parts	Appraisers	Date Performed	Trials	Parts	Appraisers	Date Performed		

APPRAISER/		PART										AVERAGE
TRIAL #		1	2	3	4	5	6	7	8	9	10	
1. A	1											
2.	2											
3.	3											
4.	AVE											$\bar{X}_A$=
5.	R											$\bar{r}_A$=
6. B	1											
7.	2											
8.	3											
9.	AVE											$\bar{X}_B$=
10.	R											$\bar{r}_B$=
11. C	1											
12.	2											
13.	3											
14.	AVE											$\bar{X}_C$=
15.	R											$\bar{r}_C$=
16. PART AVERAGE												X=
												R_p=
17.	$(\bar{r}_A + \bar{r}_B + \bar{r}_C)$ / (# OF APPRAISERS) =											$\bar{R}$=
18.	X_{DIFF} = (Max X - Min X) =											X_{DIFF}=
19.	* UCL_R = R x D_4 =											UCL_R=

* D_4 = 3.27 for 2 trials and 2.58 for 3 trials. UCL_R represents the limit of individual R's. Circle those that are beyond this limit. Identify the cause and correct. Repeat these readings using the same appraiser and unit as originally used or discard values and re-average and recompute R and the limiting value from the remaining observations.

Measurement Unit Analysis				% Tolerance (Tol)		
= R x K_1	Trials	K_1		% EV	=	100 (EV/Tol)
=	2	0.8862			=	
=	3	0.5908			=	
= $[(X_{DIFF} \times K_2)^2 - (EV^2/nr)]^{1/2}$				% AV	=	100 (AV/Tol)
=					=	
=	Appraisers	2	3		=	
	K_2	0.7071	0.5231			
= $[(EV^2 + AV^2)]^{1/2}$	Parts	K_3		% GRR	=	100 (GRR/Tol)
=	2	0.7071			=	
=	3	0.5231				
	4	0.4467				
= $R_p \times K_3$	5	0.4030		% PV	=	100 (PV/Tol)
=	6	0.3742			=	
=	7	0.3534				
	8	0.3375				
= Upper - Lower / 6	9	0.3249		ndc	=	1.41(PV/GRR)
= (Upper - Lower) / 6	10	0.3146			=	
=						

ALTO-SHAAM enthermics® **Supplier Product/Process Change Notification**

DOCUMENT NO: F-455
REVISION NO: 0

PRODUCT / PROCESS CHANGE NOTIFICATION

Complete this form and email to your Alto-Shaam/Enthermics Purchasing representative prior to making a change that affects the ability of the product to meet specified purchase requirements – see Table below for examples. Alto-Shaam reserves the right to approve or reject changes and will respond to acknowledge receipt of notification and may request clarification or PPAP Submission Requirements prior to approval. If change is rejected, Alto-Shaam will respond with reason for rejection.

ALTO-SHAAM BUYER: _____

ALTO-SHAAM PART NUMBER: _____ REVISION: _____

SUPPLIER INFORMATION

COMPANY NAME: _____
ADDRESS: _____
CITY, STATE, ZIP CODE: _____
COUNTRY: _____

EXAMPLES OF CHANGES REQUIRING SUPPLIER NOTIFICATION
Use of some other Material than that which was previously Approved.
Production from New or Modified Tooling, including replacement Tooling.
Production following upgrade or rearrangement of Tooling or Equipment.
Production from Tooling or Equipment from a different Manufacturing Location than previously Approved.
Change of Supplier's source for Materials or Services (e.g., electro polishing)
Product that has been produced after tooling inactivity of 12 months or more.
Change to quality control measures.

DETAILED DESCRIPTION OF PRODUCT / PROCESS CHANGE (attach supporting documents/pictures if needed)

_____
_____
_____

If Alto-Shaam approves this change, I Certify that samples will be manufactured using the revised product and/or process and verified to ensure that all print requirements are still meet, and dimensional, appearance, and functional performance or durability has not been altered. I also certify that documented evidence is on file and available for Alto-Shaam review.

NAME: _____ TITLE: _____

PHONE NO: _____

EMAIL: _____ DATE: _____