Hypertherm®

QA3525

Production Part Approval Process (PPAP) Manual

Level 2 Document

Rev	Date	Originator	Section(s)	Change Description
1.0	01/29/2016	Kevin Powers	All	Initial Release
2.0	02/11/2016	Kevin Powers	04, 1.13, 1.15, 5.2.1, 5.2.6	Added definition for PPAP (04), specified Tolerance method for GR&R studies and changed 20% to 30% (1.13), reworded section (1.15), included revised PRF and DCE forms (both rev 2.0)
3.0	10/26/2016	Kevin Powers	02, 1	Reworded Section 02 – Scope; Reworded Section 1 – PPAP Requirements: added reference to MC015, expanded upon the factors that determine the requirements for a specific PPAP
4.0	10/26/2016	Kevin Powers	N/A	Edited footer to show Revision 3
5.0	12/05/2016	Kevin Powers	01, Append. A, Append. B, Append. C	Added PPAP Process Flow Chart, Suppliers (Appendix B); the previous Appendix B (PPAP Related Forms) is now Appendix C; renamed Appendix A to PPAP Process Flow Chart, Hypertherm ⇔ Supplier
6.0	09/07/2017	Kevin Powers	1, 1.1, 1.2, 1.4, 1.9, 1.11, 1.13	Added note that suppliers must not modify the PRF (1.1); added statement regarding pre-PPAP activities (1); re-wrote for better clarity (1.4, 1.13); added document numbers (1.1, 1.2, 1.4, 1.9, 1.11)
7.0	04/xx/2018	Kevin Powers	03, 04, 1.4, 1.7, 1.12, 1.13, 5.1, 5.3.1, 5.3.3	Added two references in 03; added PPAP+ definition in 04; rewrote sections 1.4, 1.7, 1.12, 1.13 to reflect current practice; update flowchart in 5.1 to reflect current practice; updated two forms in 5.3 to reflect current practice
8.0	12/23/2019	Kevin Powers	1.1, 1.4, 1.10, 1.12, 3.1, 3.2, 4.2, 5.3.4	Updated the PPAP Conditionally Approved disposition; updated the copy of the KFE Form in the Appendix; minor verbiage updates throughout to better reflect actual practice

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FOREWARD

Perhaps nothing, when done properly, helps a business prevent future quality problems, and all the costs and disruptions that go with them, more than PPAP. Both the Supplier and the Customer benefit.

The key to success with the PPAP process is to embrace the fact that it is a tool for you, the Supplier(*), and not just a requirement imposed by the Customer. By adhering to the principles of the PPAP process and doing all of the due diligence, the Supplier benefits from the assurance that its process is ready and capable of meeting all of its Customers' requirements consistently throughout all future production runs, not just the first run.

Equally important, the Supplier can benefit from knowing when the process is not ready for consistent quality production. When the Supplier believes it has sufficient evidence that the process is ready, the PPAP run is initiated. The PPAP is the final validation that the production-intent process is ready. If, however, any non-conformances are encountered after PPAP parts have gone through the normal (intended) production and inspection process, it is negated. The PPAP should be terminated, root cause determined, corrective action implemented and the PFMEA and Control Plan updated. After validating the improvements, another PPAP run is initiated.

The Supplier is free to do additional PPAP related activities above and beyond what is required per the PPAP Requirements Form (PRF) that is issued by Hypertherm. The Supplier should not seek to do the minimum amount of effort; it should seek to do the optimum amount of due diligence for the purpose of preventing future problems.

(*) The general focus here is on PPAPs performed by external Suppliers to Hypertherm. However, the principles, expectations and benefits of PPAP outlined in this manual would apply internally to Hypertherm as well.

INTRODUCTION

01 Purpose

The purpose of production part approval is to determine if all Hypertherm engineering design/specification requirements are properly understood by the Supplier and that the Supplier's process has the ability to produce product meeting these requirements during an actual production run at the quoted rate. This applies to not only the first production run but to all future production runs.

This procedure defines PPAP related terms and all aspects of the PPAP process, including when a PPAP submission is required, what the general PPAP submittal requirements are and what the possible outcomes and consequences of a PPAP submission are. In addition to the description provided in the Manual's sections, PPAP process flow charts are included in Appendix A and B, and PPAP-related forms are shown in Appendix C for reference purposes(*).

This document is not meant as a training primer on PPAP or any of the many activities associated with it, such as Process FMEAs, capability studies, etc. There are numerous training resources available that the Supplier can take advantage of as needed.

02 Scope

The PPAP process defined in this manual applies to the production of items (components, parts, materials, products, assemblies, sub-assemblies, etc) for which it has been determined that a PPAP is warranted per Supplier Management Program MC015, Section 6.3 – Purchased Part Qualification.

03 References

a. **QA3524:** PPAP Workbook (forms)
b. **MC015:** Supplier Management Program (SMP) – for Hypertherm use only
c. **QA3531:** Supplier-Part Risk Assessment
d. **QA4106:** Risk-Rigor Design Review

04 Definitions/Acronyms

a. **PPAP:** Production Part Approval Process. Originally developed by the American Automotive Industry, the PPAP process defined in this Manual has been tailored to Hypertherm's specific needs, industry and business environment. PPAP is a standardized approach that helps ensure the supplier understands all Hypertherm requirements and that the process is capable, repeatable, and sustainable over the long-term.
b. **PPAP+:** If the outcome of the Supplier-Part Risk Assessment is high risk, the Hypertherm team shall determine the appropriate risk mitigating activity(ies), if any, to complement PPAP. If the outcome is specifically high part risk, the 'plus' shall entail risk-rigor design review (Ref.: 03d)
c. **PFMEA:** Process Failure Modes and Effects Analysis
d. **Beta Build:** pre-production (Beta) build using production-level processes

e. **Resourced Part:** an existing Hypertherm part that is transferred (resourced) from a current supplier to another one
f. **RPN:** Risk Priority Number

(*) *The use of Hypertherm forms, where provided, is preferred. However, the Supplier may choose to use its own forms. In that case, the information on Hypertherm's forms, at a minimum, must be included in the Supplier's forms.*

1 PPAP REQUIREMENTS

A PPAP is Supplier-Part Number-Revision Level specific. When PPAP is deemed to be warranted per Supplier Management Program MC015, Section 6.4 - Purchased Part Qualification, a part number-rev must be PPAP approved (fully or conditionally) in order for a Supplier to make production shipments of that part number-rev to Hypertherm.

The requirements for a specific PPAP will depend on the reason for the PPAP (the trigger) and the item's complexity and criticality, annual volume or usage, level of customization and whether or not it falls within a family of similar parts. Below is a list of all possible PPAP items that could be required, while supporting PPAP forms can be found in Ref.: 03a. A PPAP Requirements Form (PRF) will be issued by Hypertherm that will define the actual required items for a specific PPAP. Every PPAP must have a Hypertherm issued PRF associated with it.

Many activities may be performed and several tools utilized in the process of establishing an acceptable process. Among them are design for manufacturability (DFM), risk-rigor design review (RRDR), sample runs, measurement correlation for key features, capability studies, etc. These efforts will culminate in a successful PPAP, one that validates the readiness and capability of the process. Although these 'pre-PPAP' efforts may tend to be sequential in nature, there may be many circumstances where that is not the case. But whatever has to be done and regardless of how and when they are done, the PPAP run must come after all the pre-PPAP activities are completed. It is possible that some of the pre-PPAP activities may not need to be repeated for PPAP as long as proper PPAP protocol was followed for the pre-PPAP run (refer to Section 2 - PPAP Execution and Submission) and no subsequent changes were made to the part drawing or the process.

1.1 PPAP Requirements Form (PRF) – QA3519

A PRF will be created and issued by an appropriate Hypertherm associate. It will identify the required items for a specific PPAP and is the official trigger for the Supplier to begin execution of the PPAP. A copy of the PRF should be included in the PPAP paperwork as well as in each carton of PPAP samples shipped to Hypertherm. Note: A supplier must not mark up or modify the PRF in any way. If you believe something should be added, deleted, modified or corrected, please contact the appropriate Hypertherm Quality associate.

1.2 Part Submission Warrant (PSW) – QA3520

The Warrant contains important information regarding the part being PPAP'd. It must be signed and dated by an appropriate representative of the Supplier.

1.3 Drawing(s)

The drawing defines the engineering design requirements of the part being PPAP'd. The drawing and the PPAP are Part Number and Revision Level specific; the PPAP submission must correspond to a specific Drawing Revision, which must match the Revision called out on the PRF. All appropriate dimensions, notes and other such callouts on the drawing should be numerically indexed (ballooned) and correlate with the results on the PPAP dimensional layout form.

1.4 Key Features Evaluation (KFE) Form – QA3521

This item will be required only for new parts, and then only if the new part is designated by Hypertherm as high risk per the Supplier-Part Risk Assessment. The form will be provided to the supplier in the PPAP Workbook with the key features identified. The PPAP Measurement Method field is to be populated for each key feature listed based on agreement reached between the Supplier and Hypertherm. However, before any of this can be completed, correlation between the two parties must be demonstrated (as shown on the KFE Form). The completed form must be submitted with the PPAP and the production control methods must also be reflected in the Supplier's Process Control Plan.

1.5 Process Flow Chart

The Process Flow Chart depicts the flow of materials through the process, from incoming inspection through packaging, including all processing and inspection steps in-between. It provides a picture of the separate steps of a process in sequential order and should be in alignment with the Process Control Plan. Any outsourced operations must be clearly identified as such and must include the name of the company performing the operation. The Process Flowchart must be a controlled document. In addition to its own date/rev control, it should always reflect the latest Revision Level of the part that it was PPAP Approved to.

1.6 Process Failure Modes and Effects Analysis (PFMEA)

The PFMEA is a systematized technique which identifies and ranks the potential failure modes of a process in order to prioritize improvement actions. The PFMEA has many benefits – it is vital input into the Control Plan; it is a communication tool – but its greatest benefit, when done properly, is in the prevention of problems. It must be a controlled document. In addition to its own date/rev control, it should always reflect the latest Revision Level of the part that it was PPAP Approved to. It should also be reviewed for potential revision in response to any process changes as well as any quality issues. Ultimately, the PFMEA must continue to be a living, dynamic document.

1.7 Process Control Plan

A Process Control Plan is a written description of the system for controlling production parts and processes; it describes the actions that are required at each phase of the process. The Process Control Plan must address the key features of the product as

well as the key parameters of the process so as to minimize product and process variation. It must be a controlled document. In addition to its own date/rev control, it should always reflect the latest Revision Level of the part that it was PPAP Approved to. It should also be reviewed for potential revision in response to any process changes as well as any quality issues. Ultimately, the Process Control Plan must continue to be a living, dynamic document.

1.8 Material Tests/Certificates

The Supplier must perform the tests as required on the PRF. If the Supplier cannot perform the required tests, services must be procured from a qualified source or, upon special arrangement, from Hypertherm's laboratory. When third party laboratory services are used, the results (often in the form of a Material Certificate of Analysis or, for some non-metals, a Certificate of Compliance) should be submitted on their letterhead or normal report format. The name of the laboratory that performed the tests, part number, revision level and the date the testing took place must be indicated. Any report submitted should be signed and dated by an appropriate representative of the Supplier; this is in addition to a signature/date on the third-party laboratory report.

1.9 Packaging Method Datasheet (PMD) – MC3440

The Packaging Method Datasheet (MC3440) communicates the Supplier's intended packaging method and shipment mode to Hypertherm facilities in compliance with all Hypertherm requirements (refer also to MC3439). These requirements include, but are not limited to, the protection of the product, environmental restrictions and operational productivity.

1.10 Samples

The typical requirements for the number of parts to run and the number of samples to draw for evaluation are described in Section 2 of this Manual. Exceptions can be made. The PRF will define the number of parts to run, the number of samples to draw, the number of samples to submit to Hypertherm and to whom they should be sent. When samples are drawn from the PPAP run, they must be identified with the appropriate sequential processing number (e.g., 1, 2, 3,… 40).

1.11 Dimensional and Cosmetic Evaluation – QA3523

The results on the PPAP dimensional layout form should correlate to numerically indexed (ballooned) dimensions on the drawing. A complete evaluation includes verification of all dimensions, places and notes specified on the drawing as well as cosmetic acceptability. This evaluation shall be performed on a specific set of samples (from each cavity, die mold, etc., if applicable) as specified on the PRF. The PRF will also define the sample numbers to be sent to Hypertherm.

1.12 Process Capability Evaluation

The Supplier must perform capability studies on select key features as specified on the PRF. The typical requirements include capability and/or performance indices (Cp, Pp, Cpk and/or Ppk); the minimum acceptable limits will be shown on the PRF. In addition, requirements may include a histogram and/or a control chart associated with the data.

Applicable requirements will be specified on the PRF. As stated in 1.4 above, if this is a new part with high part risk, correlation between Hypertherm and the Supplier must be demonstrated prior to the capability evaluation.

1.13 Measurement System Evaluation

The Supplier must develop or obtain gages and measurement instruments and standards to control their processes and to determine product conformance to specifications with confidence. The Supplier will perform measurement system analysis such as correlation, gage repeatability & reproducibility (GR&R), etc., for all key features listed in Item 12 on the PRF.

Whenever performing a variable measurement GR&R, using the Tolerance method, the following values apply:

- <10%: desirable, the goal
- 10 – 30%: acceptable, Supplier is encouraged to improve
- >30%: unacceptable, do not submit PPAP, improvement action required

1.14 Performance Tests

The Supplier must perform the tests as required on the PRF. If the Supplier cannot perform the required tests, services must be procured from a qualified source or, upon special arrangement, from Hypertherm's laboratory. When third party laboratory services are used, the results should be submitted on their letterhead or normal report format. The name of the laboratory that performed the tests, part number, revision level and the date the testing took place must be indicated. Any report submitted should be signed and dated by an appropriate representative of the Supplier; this is in addition to a signature/date on the third party laboratory report. Blanket statements of conformance are unacceptable.

1.15 Checking Aids

The PPAP submittal must provide evidence that there are controls in place for any part specific inspection or testing devices or checking aids. Standard inspection instruments such as bore, ring, pin, plug and thread gages, calipers, micrometers, etc are not included.

The following checking aid documentation must be included in the PPAP:

- Checking aid design prints
- Dimensional layout confirming conformity of the checking aid to the print
- Measurement system studies for the checking aids
- Callout of the checking aid in the Control Plan with sample size and frequency of checks on product characteristics or process parameters

2 PPAP EXECUTION AND SUBMISSION

Parts produced for a PPAP must be manufactured at the production site and at the production rate using the intended normal production tooling, process, equipment,

materials, inspection/testing methods, gaging, operators, environment and process settings, e.g. feeds, speeds, cycle times, pressures, temperatures, etc. Nothing special should be done during the PPAP run. The intent of the PPAP run is not to find out if the process is ready; it should be the final validation that it is ready.

A PPAP run must begin only after the process is deemed by the Supplier to be stable. Once process stability is reached, a PPAP run is executed from which samples are drawn. The samples are to be drawn per instructions on the PRF after the completion of the normal production and inspection/testing process. These samples will be utilized for the dimensional and cosmetic evaluations, capability studies, measurement system studies and testing as specified on the PRF. The minimum PPAP run quantity and sample size will also be specified on the PRF.

If non-conformances are encountered in the drawn samples, the PPAP is negated. The Supplier shall not submit the PPAP to Hypertherm. Root cause must be determined and corrective action implemented. After confirming the improvements, another PPAP run can be initiated. The Supplier must communicate the issue to Hypertherm and advise the new target PPAP submission date.

If the Supplier wishes to propose a change to the Hypertherm design, a request needs to be processed through the appropriate Hypertherm contact. If Hypertherm approves the request, the Drawing will be revised and a new PRF will be issued. All appropriate Supplier PPAP documents must reflect the new part revision level prior to submittal of the PPAP.

All required PPAP paperwork should be aggregated, preferably in the order of the PRF, and sent electronically in one file. There are two acceptable ways to do this: either in one pdf file or using the PPAP Workbook (Excel) file provided by Hypertherm, with each required item in its own tab. Each carton of samples being sent to Hypertherm should have a copy of the PRF in it; no other paperwork should be in the cartons. The samples and paperwork should be sent at the same time; if either of the two is not ready, then the PPAP is not ready.

3 PPAP SUBMISSION EVALUATION

The evaluation of a PPAP submission consists of the evaluation of the paperwork and the evaluation of the samples if, and as, required per the PRF.

3.1 Evaluation of the PPAP Paperwork

An appropriate associate of the Hypertherm team will review the submitted documentation as follows:

- The PPAP paperwork file contains all required documentation as prescribed on the PRF
- All process documents (Flowchart, PFMEA, Control Plan)
  - demonstrate acceptable depth and comprehensiveness
  - indicate the correct part revision level, which must match the revision level on the drawing and on the PRF
  - have Date/Revision controls of their own

  - match each other in terms of the basic sequence of process steps
- The PFMEA shows reasonable risk numbers for Severity, Occurrence and Detection, and preventive actions with estimated new, lower risk numbers shown to the right are provided for the higher RPNs
- All data/results in the PPAP file demonstrate conformance to requirements (dimensional layout results, Cpk's, Gage R&Rs, Material Cert, Packaging Method Datasheet, etc)
- The Material Cert is a Certificate of Analysis if required per the PRF, and not a Certificate of Conformance. In addition, the copy of the Material Cert provided should show evidence that the Supplier reviewed and confirmed that the information on the Material Cert is in fact conforming. This can be done with check marks, signature and date.

3.2 Evaluation of the PPAP Samples

An appropriate associate of the Hypertherm team will evaluate the submitted samples as follows:

- The correct number of samples were received
- The samples are appropriately identified/numbered
- The samples are in acceptable condition cosmetically
- Measure selected dimensions on selected samples as deemed appropriate
- Perform appropriate tests on selected samples as applicable
- Distribute samples to other associates for evaluation as appropriate

4 PPAP DISPOSITION

Suppliers will be notified of the PPAP disposition. There are three possible outcomes: PPAP Approved, PPAP Conditionally Approved and PPAP Rejected.

4.1 PPAP Approved

PPAP Approval indicates that the part and documentation fully meet all specifications and requirements. The Supplier is therefore authorized to build and ship production quantities as directed by Hypertherm, including conforming parts built from the approved PPAP run.

4.2 PPAP Conditionally Approved

PPAP Conditional Approval indicates that the PPAP submission, whether because of an issue with the samples or with the documentation or both, does not meet all Hypertherm specifications and requirements. However, the Hypertherm team has determined, after carefully weighing the need for the parts versus risk to the Customer, that use of the parts in production is the best course of action. PPAP Conditional Approval permits shipment of product for a specified period of time, quantity of parts or some other condition. Parts made from the PPAP run can be used in production orders to Hypertherm provided they fall within the specified condition. The Supplier must determine root cause and corrective action to address the non-conformities preventing full PPAP Approval. A new PRF will be issued by Hypertherm for PPAP resubmission. PPAP disposition to Approved status is required for full authorization of production

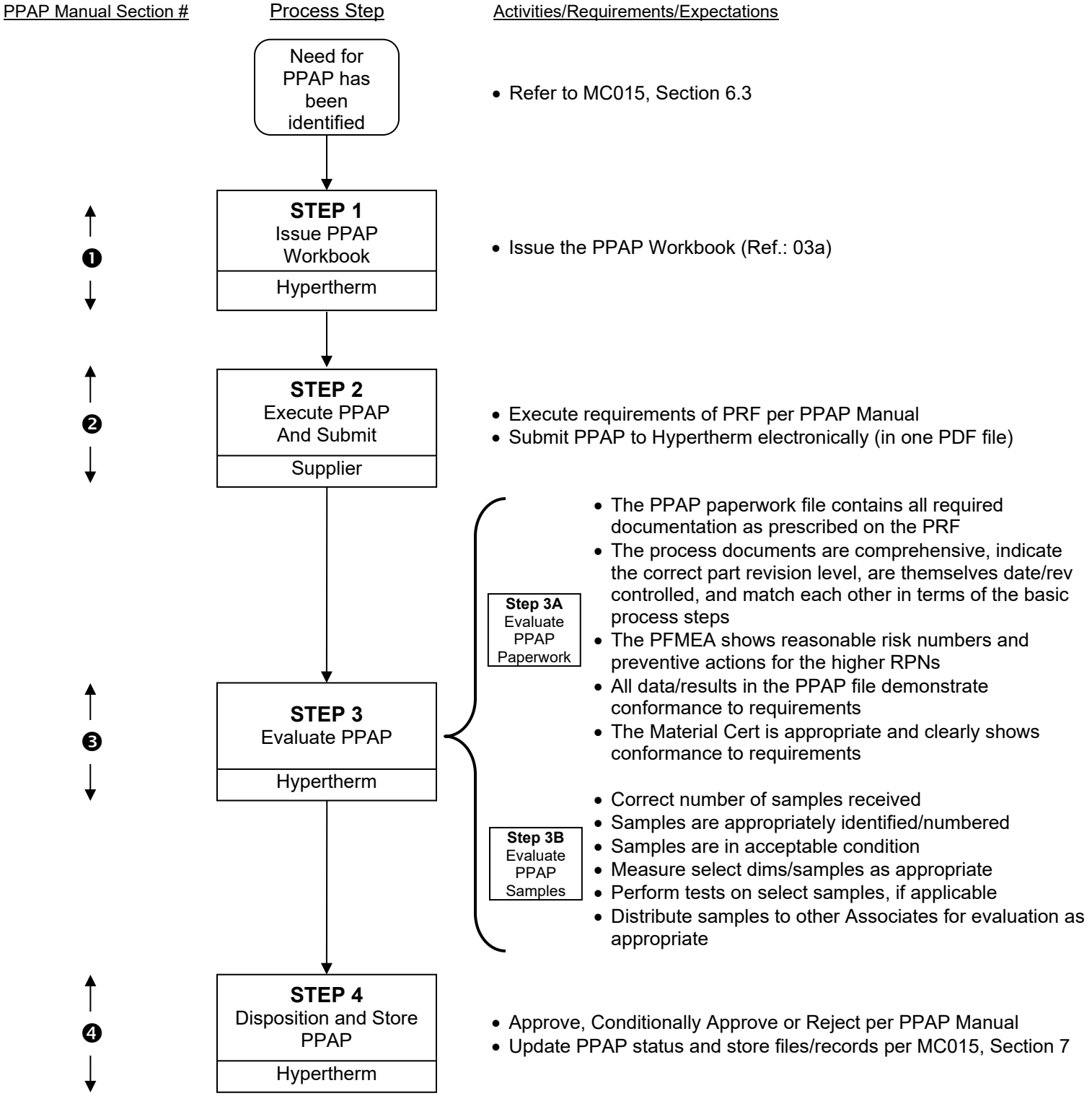
shipments. If the condition set for this status is about to expire, it may be extended by the appropriate Hypertherm associate. Or, if there is no longer any interest in pursuing Approval, the status is to be changed to PPAP Closed. Once the conditional has expired, the Supplier is not authorized to ship production lots of this specific Part Number-Rev. Conditional status is not meant to be a permanent status; it must eventually be brought to conclusion, either as Approved or Closed.

4.3 PPAP Rejected

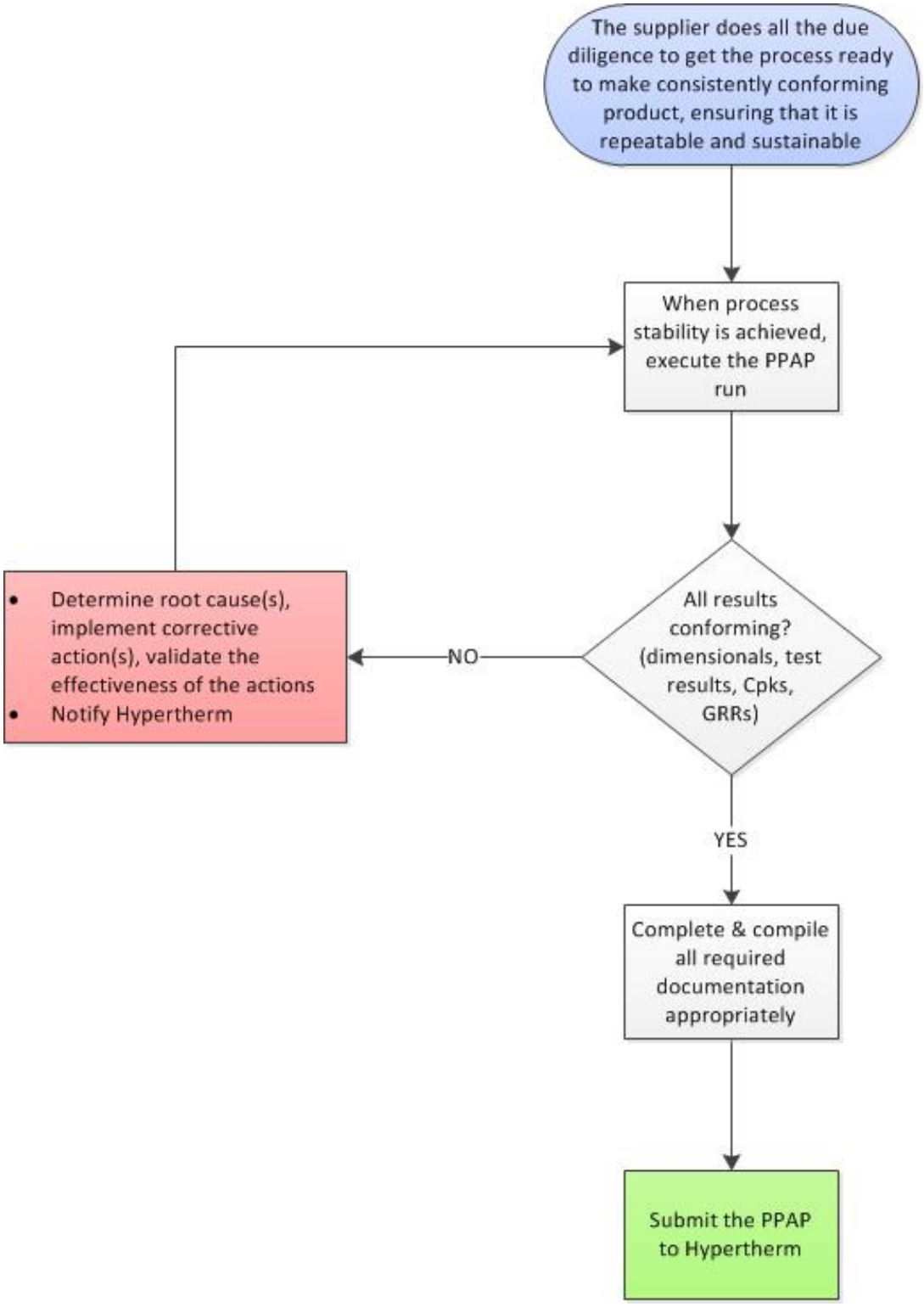
PPAP Rejection indicates that the PPAP submission, whether because of an issue with the samples or with the documentation or both, does not meet all Hypertherm specifications and requirements. All parts made from the failed PPAP run should be segregated as nonconforming and cannot be shipped to Hypertherm, unless otherwise agreed upon between Hypertherm and the Supplier. The Supplier must determine root cause and implement correction action to address the non-conformities. A new PRF will be issued by Hypertherm for PPAP resubmission. The Supplier is not authorized to build and ship production parts until PPAP Approval is achieved.

5 APPENDICES

5.1 **Appendix A.** PPAP Process Flow Chart, Hypertherm ⇔ Supplier



5.2 **Appendix B.** PPAP Process Flow Chart, Supplier



5.3 **Appendix C.** PPAP Related Forms

5.3.1 **QA3519:** PPAP Requirements Form (PRF)

Hypertherm	PPAP Requirements Form (PRF)		
Part Number:	Rev:	Description:	
Supplier:		PPAP Due Date:	
Hypertherm Team:		QA:	CP/SC:
Project:		Part Risk (if new):	EAU:
Reason for Submission:			
Comments:			

Submission Requirements			
	PPAP Documentation/Items	**Yes/No**	**Comments**
1.	**Copy of PRF** (QA3519)		
2.	**Part Submission Warrant** (QA3520)		
3.	**Drawing(s)**		
4.	**Key Features Evaluation Form** (QA3521)		
5.	**Process Flow Chart** Outsourced operations must be clearly identified, including the name of the company performing the operation.		
6.	**Process FMEA**		
7.	**Process Control Plan**		
8.	**Material Test** metals & elast nonmetals. Sup reviewed for co		
9.	**Packaging Me**		
10.	**Samples** Unless otherwise specified in the Comments column to the right, after the process is deemed by the Supplier to be stable, run 100 pcs and draw 30 consecutive samples from somewhere within the 100 pcs.		
11.	**Dimensional and Cosmetic Evaluation** (QA3523) Dimensional results should be tied to ballooned characteristics on the drawing. Unless otherwise specified in the Comments column to the right, verify all dimensions, places, notes and cosmetics for sample numbers 1, 10, 20 and 30 of the 30 consecutive samples.		
12.	**Process Capability Evaluation of Key Features** Refer to the Comments column to the right regarding the number of samples to be measured (typically all 30 consecutive), the features to be evaluated, the capability/performance indexes to be used (Cp, Cpk, Pp, Ppk) and their requirements (typically Cpk 1.33 minimum), as well as any additional requirements. If this is a new part and designated as high part risk, correlation may be required prior to capability evaluation (refer to Item 4 above).		
13.	**Measurement System Evaluation** For the production gaging of all key features listed in Item 12 above, GR&R (Tolerance Method) <10% desirable; 10-30% acceptable (Supplier is encouraged to improve); >30% unacceptable.		
14.	**Performance Tests**		
15.	**Checking Aids**		
	Prepared By:		Date:

FOR REFERENCE PURPOSES ONLY
(consult QA3524 for current revision)

5.3.2

5.3.3 **QA3520:** Part Submission Warrant Form

Hypertherm	PPAP Submission Warrant (PSW)	
Part Description:	Part Number:	Part Rev.:
Regulatory Related? ☐ Yes ☐ No	Project	PO No.:

SUPPLIER MANUFACTURING LOCATION		SUBMISSION INFORMATION	
Supplier Name:	Supplier ID:	☐ Material	☐ Dimensional/Cosmeti
		☐ Statistical (SPC/Cpk/Ppk/GF	☐ Performance
Street Address:		Hypertherm Receiving Location:	
City / State or Province:		Hypertherm Central Procurement / Supply Chain Rep:	
Postal Code / Country:		Hypertherm Quality Representative:	

REASON FOR SUBMISSION

☐ Initial Submission	☐ Test or Inspection Method Change	☐ New or Modified Tools, Dies, Molds, Patterns, etc.
☐ Correction /Resubmission	☐ Sub-supplier Change	☐ New, Refurbished, Moved, Rearranged Equipment
☐ Drawing Revision	☐ BOM Change (for sub-assemblies)	☐ Tooling Inactive for More Than 24 Months
☐ Use of Another Material	☐ Manufacturing Location Change	☐ Other - Please Specify:
☐ Process Ch[illegible]		

FOR REFERENCE PURPOSES ONLY
(consult QA3524 for current revision)

[illegible] REQUIRED:

☐ Material Evaluation	☐ YES	☐ NO	
☐ Dimensional/Cosmetic Evaluation	☐ YES	☐ NO	
☐ Statistical Evaluation	☐ YES	☐ NO	
☐ Performance Evaluation	☐ YES	☐ NO	

DECLARATION

I affirm that this PPAP submission meets all requirements. The PPAP file contains all the documentation required per the PRF and all results are acceptable (unless previously communicated to, and authorized by, Hypertherm). The PPAP run and, thus, the samples drawn, evaluated and submitted were made from the normal production intended process whereby nothing special was done.

EXPLANATION / COMMENTS:

SUPPLIER SIGNATURE:	TITLE:	DATE:

PPAP DISPOSITION:

AUTHORIZED HYPERTHERM SIGNATURE: DATE:

5.3.4 **QA3521:** Key Features Control (KFC) form

Hypertherm	Key Features Evaluation (KFE) Form

For the key features identified below, correlation between the Supplier and Hypertherm may be required. The first step is to ensure both parties measure each feature the same; therefore, the two parties must reach agreement on the most effective method of measurement. Correlation, where required, must be demonstrated prior to conducting the capability studies (refer to the Correlation Process Flow tab for more details). Agreement must also be reached regarding how the supplier intends to control the key features during production. This completed form must be included in the PPAP documentation if indicated on the PRF (Item # 4) and the agreed upon control methods must be reflected in the Supplier's Control Plan (Item # 7 on the PRF).

Part Number:		Rev:	Description:	Supplier:		Date:		
Key Feature*			Location on Print	Function/Purpose	PPAP Measurement Method for Capability Study	CORRELATION		
#	Type	Detail				Hyp Result	Supplier Result	Cross Result

5.3.5 **QA3522:** PFMEA Hypertherm Ranking Scale Guidelines

Hypertherm	PFMEA Rating Scale Guideline		
RATING	**SEVERITY** of the effect of the process failure mode if it occurs	Likelihood of **OCCURRENCE** of the process failure mode	Likehood of **DETECTION** if the process failure mode, or its effect, occurs
10	**HAZARDOUS / DANGEROUS** Failure mode, or its resulting effect, could be hazardous / dangerous to C/customer	**INEVITABLE, ALMOST CERTAIN, PERSISTENT** 1 occurrence per day > 1 in 10 (10% Failure Rate) > 100,000 PPM Cpk < 0.83	**ALMOST IMPOSSIBLE** Failure mode, or its resulting defect, cannot be detected or 1 in 10 failures would make it to C/customer
9	**REGULATORY NONCOMPLIANCE** Failure mode, or its resulting effect, would create government or agency regulatory noncompliance	**EXTREMELY HIGH** 1 occurrence every 3 or 4 days < 1 in 10 (10% Failure Rate) < 100,000 PPM Cpk ~0.83	**REMOTE** Control is achieved with indirect or random checks only or 1 in 20 failures would make it to C/customer
8	**EXTREME** Failure mode, or its resulting effect, could have an extreme impact on the C/customer in terms of deliveries, line shutdowns, length of time and/or cost to recover or product inoperable or has loss of primary function	**VERY HIGH** 1 occurrence per week < 1 in 20 (5% Failure Rate) < 50,000 PPM Cpk ~1.00	**VERY LOW** Control is achieved by visual inspection only or 1 in 50 failures would make it to C/customer
7	**SEVERE** Failure mode, or its resulting effect, could have a severe impact on the C/customer in terms of deliveries, line shutdowns, length of time and/or cost to recover or product operates at reduced level of performance	**HIGH** 1 occurrence per month < 1 in 40 (2.5% Failure Rate) < 25,000 PPM Cpk ~1.17	**LOW** Sampling inspection/testing is performed or 1 in 100 failures would make it to C/customer
6	Failure [illegible] impa[illegible] sh[illegible]	[illegible]	[illegible]TELY LOW [illegible]ection/testing is performed [illegible]ource inspection [illegible] [illegible] make it to C/customer
5	[illegible] Failure mode, or its resulting effect, could have a significant impact on the C/customer in terms of deliveries, line shutdowns, length of time and/or cost to recover	[illegible] 1 occurrence every 6 months < 1 in 200 (0.5% Failure Rate) 5,000 PPM Cpk ~1.33	[illegible] 100% inspection/testing is performed or 1 in 500 failures would make it to C/customer
4	**MODERATE** Failure mode, or its resulting effect, could have a moderate impact on the C/customer in terms of deliveries, line shutdowns, length of time and/or cost to recover	**LOW** 1 occurrence per year < 1 in 1,000 (0.1% Failure Rate) < 1,000 PPM Cpk ~1.50	**MODERATELY HIGH** An effective SPC program is in place with stable, in-control, processes and Cpks greater than 1.33 or 1 in 1,000 failures would make it to C/customer
3	**MINOR** Failure mode, or its resulting effect, could have a minor impact on the C/customer in terms of deliveries, line shutdowns, length of time and/or cost to recover	**VERY LOW** 1 occurrence every 1 to 3 years < 1 in 10,000 (0.01% Failure Rate) < 100 PPM Cpk ~1.67	**HIGH** Failure mode, or its resulting defect, is obvious or 100% automatic inspection with regular calibration and maintenance of the inspection equipment; or 1 in 2,000 failures would make it to C/customer
2	**TRIVIAL** Failure mode, or its resulting effect, could have a trivial impact on the C/customer in terms of deliveries, line shutdowns, length of time and/or cost to recover	**EXTREMELY LOW** 1 occurrence every 3 to 5 years < 1 in 100,000 (0.001% Failure Rate) < 10 PPM Cpk ~2.00	**VERY HIGH** Process would not allow further processing to continue - process is mistake/error-proofed for this failure mode or 1 in 5,000 failures would make it to C/customer
1	**NO IMPACT** Failure mode, or its resulting effect, will have no impact on the C/customer in terms of deliveries, line shutdowns, length of time and/or cost to recover	**VIRTUALLY NEVER** 1 occurrence in greater than 5 years < 1 in 200,000 (0.0005% Failure Rate) < 5 PPM Cpk > 2.00	**ALMOST CERTAIN** Design would not allow further processing to continue - design is mistake/error-proofed for this failure mode or 1 in 10,000 failures would make it to C/customer

5.3.6 **MC3440:** Packaging Method Datasheet (PMD)

Hypertherm	Packaging Method Datasheet (PMD)						
Part Number:				Supplier:			
☐ New Pack Method		☐ Modified Pack Method		Date:			
Container Dimensions (in)			Weight Per Box (not to exceed 50 lbs):	Pallet Dimensions (in)			Weight Per Pallet (lbs):
L	W	H		L	W	H	
☐ Singlewall ☐ Doublewall ☐ Triplewall			ECT:	ontainers per pallet:			
Parts per Box:			Mullen:	Parts per pallet:			
				Has the pallet been heat treated? ☐ Yes ☐ No			
Interior Container Design Photo - all dunnage included				Unit Load Photo (if using a pallet)			
Please list all x				on to ensure that			
Item				pertherm			
				associates should be able to easily remove product. Packaging materials should not impede further processing of the parts.			
				Please note that the following materials are **NOT accepted** at our facilities: **foam in place, expanded polysterene, PVC** plastics and loose fill materials such as **eps peanuts.**			
Shipping Mode:							
Supplier Ship From Address:				Comments:			

Please refer to Supplier Packaging Guideline SOP MC3439

International Suppliers Label Requirement: U.S. customer laws require that each article produced abroad and imported into the United States be marked with the English name of the country of origin to indicate what country the article was manufactured or produced in. If the articles themselves are exempt from marking, then the outermost container must be marked to show the articles' country of origin.

5.3.7 **QA3523:** Dimensional and Cosmetic Evaluation

Hypertherm	Dimensional and Cosmetic Evaluation									
Part Number:		Rev.:		Description:						
Supplier:				Tool #/Cavity #:						
Name of Outsourced Laboratory:										
#	CHARACTERISTIC (ballooned on drawing; all dims, places, GD&T, notes & cosmetics)	METHOD USED	SUPPLIER MEASUREMENT RESULTS					OK	NOT OK
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
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18									
19									
20									
21									
22									
23									
24									
25									
Signature:		Title:				Date:				

FOR REFERENCE PURPOSES ONLY
(consult QA3524 for current revision)