1. PURPOSE

1.1. The purpose of this work instruction is to outline the Supplier requirements for verifying **purchased product** supplied to a Climate Control manufacturing facility.

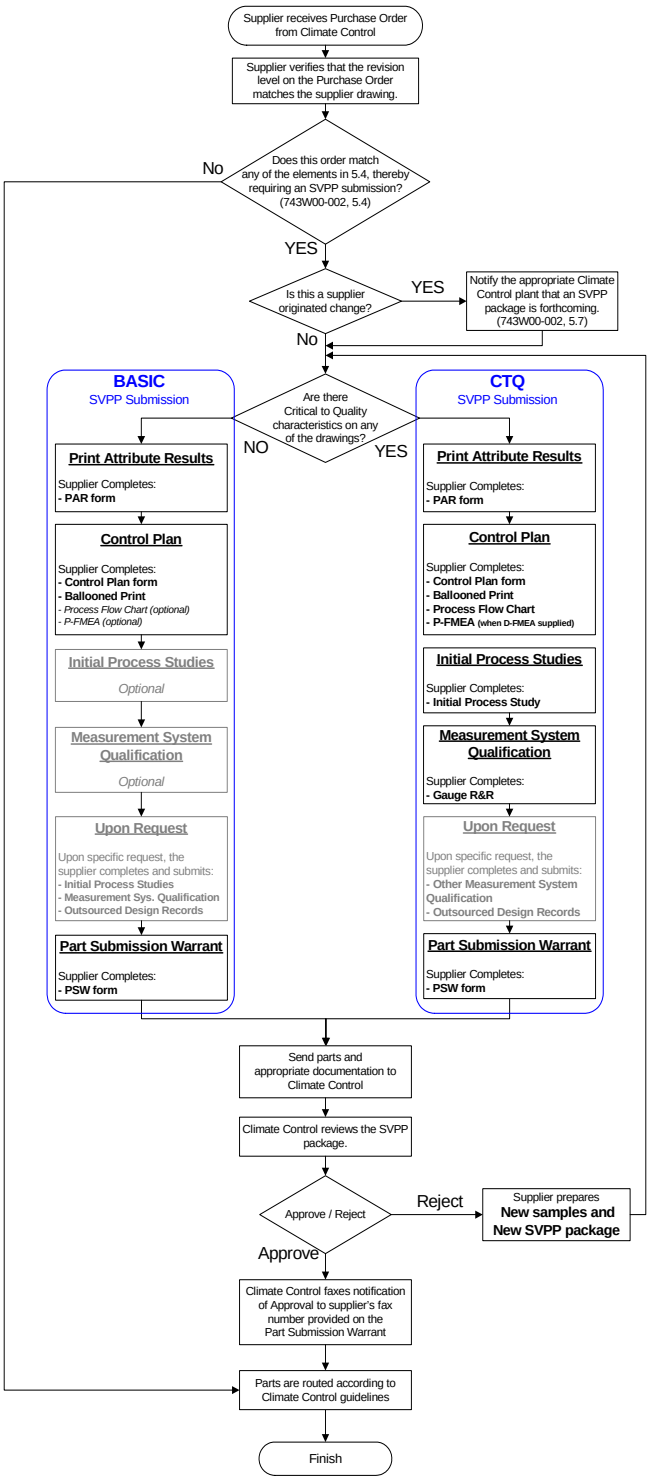
2. SCOPE

2.1. An integral part of product development or product change and the associated quality of those products is the verification of initial parts for use in Climate Control manufacturing. This work instruction is applicable to any supplier of materials, components or other products to a Climate Control production facility regardless if they are custom fabricated parts or catalog parts (off-the-shelf). Supplier ownership of the conformity and quality to Climate Control standards is vital to our efforts in building top quality climate control equipment.

3. REFERENCES

710W00-002	Material Deviation Authorization
741P00-001	Purchasing Process
742P00-001	Purchasing Information
743P00-001	Verification of Purchased Product
743W00-001	Plant Verification of Purchased Product
743F00-001	Part Submission Warrant
743F00-002	Print Attribute Results Form
743F00-004	Control Plan Form
743F00-005	Initial Process Study Form
852F00-001	Preventive/Corrective Action Request form
TKS18005	Definition and Classification of Critical to Quality Characteristics
www.aiag.org	Automotive Industry Action Group (AIAG/QS 9000)
www.nist.gov	National Institute of Standards and Technology

4. FLOWCHART


Supplier receives Purchase Order from Climate Control
Supplier verifies that the revision level on the Purchase Order matches the supplier drawing.
Does this order match any of the elements in 5.4, thereby requiring an SVPP submission? (743W00-002, 5.4)
No
YES
Is this a supplier originated change?
YES
Notify the appropriate Climate Control plant that an SVPP package is forthcoming. (743W00-002, 5.7)
No
BASIC
SVPP Submission
Are there Critical to Quality characteristics on any of the drawings?
NO
YES
CTQ
SVPP Submission
Print Attribute Results
Supplier Completes:
- PAR form
Control Plan
Supplier Completes:
- Control Plan form
- Ballooned Print
- Process Flow Chart (optional)
- P-FMEA (optional)
Initial Process Studies
Optional
Measurement System Qualification
Optional
Upon Request
Upon specific request, the supplier completes and submits:
- Initial Process Studies
- Measurement Sys. Qualification
- Outsourced Design Records
Part Submission Warrant
Supplier Completes:
- PSW form
Print Attribute Results
Supplier Completes:
- PAR form
Control Plan
Supplier Completes:
- Control Plan form
- Ballooned Print
- Process Flow Chart
- P-FMEA (when D-FMEA supplied)
Initial Process Studies
Supplier Completes:
- Initial Process Study
Measurement System Qualification
Supplier Completes:
- Gauge R&R
Upon Request
Upon specific request, the supplier completes and submits:
- Other Measurement System Qualification
- Outsourced Design Records
Part Submission Warrant
Supplier Completes:
- PSW form
Send parts and appropriate documentation to Climate Control
Climate Control reviews the SVPP package.
Approve / Reject
Reject
Supplier prepares New samples and New SVPP package
Approve
Climate Control faxes notification of Approval to supplier's fax number provided on the Part Submission Warrant
Parts are routed according to Climate Control guidelines
Finish

5. OVERVIEW OF SVPP PACKAGE

5.1 **Types of Submittals** – There are two types of SVPP Package submissions; the required type is determined by the presence or absence of Critical to Quality characteristics (CTQ's) on the print or other applicable engineering or purchasing specifications. The two types of SVPP submissions are described below:

5.1.1 **Basic** – When Critical to Quality characteristics *are not* present on the print or other applicable specifications, the submission type is labeled "Basic."

5.1.2 **CTQ** – When Critical to Quality characteristics *are* present on the print or other applicable specifications, the submission type is labeled "CTQ."

5.2 **Component Overview -** The following reference matrix is an overview of the components in a complete SVPP package.
NOTE: This matrix is for reference only. Actual requirements for each component may be found in the appropriate sections of this document.

Submission requirements SVPP Package	Section	BASIC	CTQ
Part Submission Warrant	6.0	**REQUIRED**	**REQUIRED**
Print Attribute Report (PAR)	7.0	**REQUIRED**	**REQUIRED**
Control Plan	8.0	**REQUIRED**	**REQUIRED**
⇨ Control Plan Form	8.4.1	REQUIRED	REQUIRED
⇨ Ballooned Print	8.4.2	REQUIRED	REQUIRED
⇨ Process Flow Chart	8.4.3	*Optional*	REQUIRED
⇨ P-FMEA	8.4.4	*Optional*	*REQUIRED
Initial Process Studies	9.0	*Optional*	**REQUIRED**
Measurement System Qualification (MSQ)	10.0		
⇨ Gauge R&R	10.1.3	*Optional*	**REQUIRED**
⇨ Other information	10.1.1 - .2	*Upon Request*	*Upon Request*
Outsourced Design	11.0	*Upon Request*	*Upon Request*

5.2 To ensure the quality of parts in Climate Control's inventory, **SVPP is required regardless of Climate Control's production status**. This includes prototype, pre-production and production parts.

5.3 Submission Requirements – WHEN IS SVPP REQUIRED? - The full requirements for Supplier Verification of Purchased Product (SVPP) shall be completed prior to the first shipment that follows one or more of the conditions listed below. Due to the varied nature of parts and services that Climate Control purchases, the list below is not exhaustive. Using this list as a guideline, Climate Control may require submission of the SVPP Package for other events similar to those listed.

5.3.1 A new part / product.

5.3.2 A sourcing change by Climate Control.

5.3.3 An engineering change (i.e. drawing revision, part revision, part number change). All engineering revisions, regardless of whether or not actual dimensional changes occur, must be verified that the specifications have been met for that revision level.

5.3.4 Use of alternative materials other than what was used in a previously approved part. NOTE: The material change must be in accord with specified allowable materials.

5.3.5 A significant change to the manufacturing process.

5.3.6 A change in secondary suppliers.

5.3.7 Product produced from a new die, mold or other tooling. Routine die/tooling maintenance may not require SVPP.

5.3.8 A change of manufacturing equipment.

5.3.9 A change in manufacturing location, utilizing either new or relocated tooling and equipment.

5.3.10 A significant gap in production. (i.e. if a product has not been produced in a considerable amount of time.)

5.4 Submission Requirements – When is SVPP Optional? – The supplier may elect to submit an SVPP package at any time. The following list suggests some events when an optional submission may be requested.

- To document relevant Material Deviation Authorization (MDA) information.
- To verify a part after an MDA has expired.
- To document Corrective Action results and/or information.
- Material Reject Notice (MRN) / Quality performance verification.

5.5 Submission Requirements – WHEN IS THE SVPP PACKAGE DUE? – Submission of SVPP Packages will be prior to, or included with, the shipment or production lot that it represents.

NOTE: It is preferred to send the SVPP package prior to shipment of production parts.

5.6 **Submission Requirements – Notification –** Prior to sending an SVPP report that is being submitted due to a Supplier originated change (process change, location change, etc.), the supplier must notify the receiving plant in writing, that an SVPP submission is forthcoming. This notification must be at least 5 business days prior to the parts shipping from the supplier location.

5.7 **Part shipments are not to be made unless all specifications have been satisfactorily met OR an authorized material deviation to the requirements has been issued.** (Reference Material Deviation Authorization Work Instruction 710W00-002)

5.8 **Sample Parts origin** - Part samples used for SVPP submission must be taken directly from the manufacturing process that they are representing. This applies to all parts, regardless of status (e.g. pre-production, production, etc.)

5.9 **Authority** - SVPP requirements for specific parts or specific submissions may be modified from this standard with the appropriate approvals, as listed below. Blanket or long-term modifications to the procedure are not allowed. Any modifications will apply to the specific time and location specified. Other Climate Control employees do not have authority to independently modify the SVPP requirements.

5.9.1 **To Reduce the Requirements** in any way will require a Material Deviation Authorization per Material Deviation Authorization Work Instruction 710W00-002.

5.9.2 **To Increase or add to the Requirements** in any way shall require written approval from the following entities. This approval must be authorized by all parties below. The names of the authorizers must be noted at the bottom of the Part Submission Warrant. A copy of the PSW, noting all requested info shall be sent to the supplier at or before the purchase order is placed for the affected part. A copy of the signed authorization must be kept on file at the receiving location:

5.9.2.1 Quality Manager at the receiving location.
5.9.2.2 Engineering Representative.
5.9.2.3 Plant Buyer.
5.9.2.4 Supply Manager.

6. Part Submission Warrant

6.1. **Overview & Submission Requirements –** The Part Submission Warrant (PSW) is the "cover sheet' for the SVPP Package. It is intended to provide a summary of the specific information being submitted as components of the SVPP Package.

Submission requirements for the Part Submission Warrant	SVPP Package Type	
	BASIC	CTQ
Part Submission Warrant (743F00-001)	REQUIRED	REQUIRED

6.2. The Part Submission Warrant shall be completely filled out with all appropriate information. Incomplete or missing information may be cause for rejection.

6.3. Only the Climate Control version of the Part Submission Warrant form (743F00-001) shall be included with all SVPP package submissions. Substitutes and other variants of the form are not acceptable.

6.4. One Part Submission Warrant shall be submitted for an assembly. The top-level assembly listed on the Part Submission Warrant shall cover all lower level prints, sub-assemblies, etc.

7. Print Attribute Report

7.1. **Overview & Submission Requirements -** The Print Attribute Report (PAR) shall consist of the following elements. These elements, when combined, provide documentation that the purchased product meets all of the requirements specified on the print and other applicable specifications:

Submission requirements for the Print Attribute Report	SVPP Package Type	
	BASIC	CTQ
Print Attribute Results Form - 743F00-002 ⇨ Dimensions ⇨ Material ⇨ Coatings ⇨ Performance Specifications ⇨ Appearance / Cosmetic Specifications ⇨ Engineering Notes ⇨ Engineering Specifications ⇨ Checking Aids ⇨ All other print attributes	REQUIRED	REQUIRED
Samples (per 7.2)	REQUIRED	REQUIRED
Ballooned Print	REQUIRED	REQUIRED

7.2. The standard **sample size** for Print Attribute Results (PAR) submission is 3 pieces. The actual **Samples** that are measured and recorded on the Print Attribute Form will be submitted as part of the SVPP Package. These parts should be segregated and clearly labeled (e.g. 1, 2, 3) as appropriate.

7.2.1. Analysis is required for each tool used (i.e. if two identical tools are used to meet production levels, both tools must be verified, so 6 samples will be required).

7.2.2. In the case of multi-cavity **or equivalent** tooling, an analysis must be performed on EACH cavity as if they were separate tools. For example, if a two-cavity mold is used in the process, a 3-piece layout is required for EACH cavity, for a total of 6 pieces.

7.2.3. For the above cases, the data should be presented on separate forms, with the cavity identification listed clearly on the form. The documentation and sample parts submitted to Climate Control must be clearly identified to ensure that the data is traceable to an individual cavity and inspected parts.

7.3. The **Print Attributes Results Form** 743F00-002 documents **all** attributes on the print and applied specifications, including, but not limited to:

7.3.1. **Dimensions** – All dimensions must be documented. Assemblies must be measured according to the assembly print and according to the prints for the individual parts. This includes all geometric tolerance requirements.

7.3.2. **Material** – All material properties specified by the print or by other applied engineering / purchasing documentation shall be considered an attribute and verified for compliance on the Print Attribute Report. Each material property element shall be listed as a separate line on the PAR. Where applicable, physical properties (e.g. material thickness, etc) will be verified physically. For verification of material composition, etc., a material Certificate of Compliance from the original manufacturer may be acceptable. (Certificates of Conformance from any source other than the original manufacturer are not acceptable). **Refer to the Material Approval Requirements Supplement on the SVPP web page (http://cc.irco.com/suppliers/svpp.htm) for specific material approval requirements and requirements for reportable substances.** Questions on material approval or reporting requirements can be directed to Climate Control Material Services (CC_Material@irco.com).

7.3.3. **Coatings** – Paint, plating, and other coatings and finishes are to be documented for all specified criteria. Examples of this include, but are not limited to, thickness, chemical composition, color, gloss, adhesion, etc. An original manufacturer generated Certificate of Conformance is allowed for those characteristics that cannot be otherwise measured, such as chemical composition and related characteristics.

7.3.4. **Performance specifications** – All applicable performance requirements must be documented. This includes specifications that are directly noted on the print and specifications that are found within customer or industry specifications that are specifically called out on the print. The detailed specification and results must be completely recorded on the Print Attribute Results form.

7.3.5. **Appearance / Cosmetic requirements** – All applicable appearance requirements must be documented. Included are specifications that are directly noted on the print and specifications that are found within customer or industry specifications that are specifically called out on the print. The detailed specification and results must be completely recorded on the Print Attribute Results form.

7.3.6. **Engineering Notes** – <u>All</u> engineering notes must be documented on the Print Attribute Results form. The note should be copied or summarized in the "Numeric Value or Description" column and each sample's compliance to the note must be explicitly listed in the "Measurement Results" column. Please be detailed in documenting the sample results; general statements of "OK" will be acceptable only in limited cases. If any particular note does not apply to the product, then it still must be listed, but identified as "not applicable." For clarity, it is acceptable to break out a single note into multiple lines on the PAR form.

NOTE: In most cases the manufacturing process should not be specified on the print. According to ANSI Y14.5M-1994, section 1.4(e): "The drawing should define a part without specifying manufacturing methods. Thus only the diameter of a hole is given without indicating whether it is to be drilled, reamed, punched or made by any other operation…."

7.3.7. **Engineering Specifications** – Due to the complexity of many parts / assemblies, it is often necessary to define the part / assembly by utilizing supporting documentation such as Thermo King Engineering Specifications (TKS's), Hussmann Engineering Case Specifications (ECS's) or other industry standards (ANSI, ASTM, etc.). The requirements detailed in these specifications are considered an attribute and must also be listed and verified on the PAR form.

7.3.8. **Checking Aids** – Any aids (fixtures, gages, special equipment, etc.) that are used in the inspection and measuring of the sample parts shall be documented on the PAR or PSW and provided upon request.

7.4. Other variants of the PAR form may be acceptable, provided that the content of the original form is maintained and the receiving location has provided **prior written approval** to use an alternate form. For sub-assembly components, it is the responsibility of the supplier to distribute this form to their sub-suppliers for completion and submittal with the package.

7.5. The **Ballooned Print** will consist of the Climate Control print that is numbered to correspond to the attributes listed on the Print Attribute Results form. **SUPPLIER GENERATED PRINTS ARE NOT ACCEPTABLE FOR SVPP SUBMISSION** if a Climate Control print exists.

7.6. **Catalog Parts** - As a general rule, verification of the part identity is sufficient for fulfilling the requirements of the PAR report. However, Climate Control still reserves the right to request a full SVPP package report (based on this procedure.) The scope and/or activities required for this verification will vary greatly depending upon the nature of the part. Please consult the Quality Manager at the plant receiving the SVPP paperwork for clarification of the individual requirements.
NOTE: Verification of part identity may not be sufficient for fulfilling the requirements of the Control Plan or Initial Process Study modules of the SVPP package (where required).

8. Control Plan

8.1. **Overview & Submittal Requirements –** The Control Plan is the documentation of the supplier's long term, on-going plan to control the quality and repeatability of the purchased item. It also contains a plan of action, should an out-of-control or non-conforming situation be detected. The Control Plan module of the SVPP Package includes the following elements:

Submission requirements for the Control Plan	SVPP Package Type	
	BASIC	CTQ
Control Plan Form	REQUIRED	REQUIRED
Ballooned Print	REQUIRED	REQUIRED
Process Flow Chart	*optional*	REQUIRED
Process Failure Modes and Effects Analysis	*optional*	*REQUIRED

8.2. **Upon Request –** At times Climate Control may request a current copy of the supplier's control plan. This request may also require evidence of the activities included on the control plan, including SPC data, etc. These requests from Climate Control should be in writing, should allow the supplier a reasonable amount of time to fulfill, and should not be punitive in nature.

8.3. **Exceptions –** In a few select cases, the supplier may elect to omit the Control Plan Module and its components, per the exception cases listed below. Note: If specifically requested by Climate Control, the supplier will still be required to submit the Control Plan, regardless of these exceptions. Standard exceptions include:

8.3.1. **Catalog items** – If SVPP is being submitted to verify a catalog item, then no Control Plan is required.

8.4. **What is required in the Control Plan?** – The following are general items that are required in the control plan. The Control Plan should completely and accurately reflect all of the activities that are done to control the quality and repeatability of the product. Therefore, the actual control plan may vary greatly between products. As such, this is not intended to be an exhaustive list. The following are minimum guidelines for the Control Plan and its use:

8.4.1. The **Control Plan Form** – The Control Plan form submitted by the supplier may be in any format provided that the supplier's form includes, at a minimum, all information required by the Climate Control form 743F00-004 (*the Climate Control form and the AIAG, QS-9000 Control Plan forms are preferred*).

8.4.2. The control plan should cover all phases of the process, including receiving, in-process and out-going phases. Emphasis should be placed on the items that have the lowest quality and the highest risk. *Reference the Print Attribute Report section (7.3) of this document for a more complete list of attributes and specifications that should be included in the Control Plan elements.*

8.4.3. **When Critical to Quality characteristics are present**, the following must be included in the Control Plan.

8.4.3.1. All CTQ characteristics and/or their contributing manufacturing process factors **must** be detailed with the specific control methods for that part number and feature.

8.4.3.2. It is **strongly recommended** that all Critical to Quality characteristics should be under Statistical Process Control wherever possible.

8.4.4. Additional characteristics and processes should be included as appropriate, according to the supplier's specific process.

8.4.5. In addition to controlling the characteristics, where appropriate and where the process is thoroughly understood, the control plan should focus on the process input variables that affect the process. (For example, if coating thickness is the characteristic being measured, it may be more valuable to control the input variables such a temperature, humidity, time in oven, etc.)

8.4.6. All measurements and activities (including reaction to out-of-specification conditions) required on the Control Plan form must be completed and documented as stated on the Control Plan.

8.4.7. The Control Plan is a living document and should be updated appropriately as improvements or changes in the specifications, design or process occur.

8.4.7.1. For more information on Control Planning and how to write a Control Plan, please reference the Automotive Industry Action Group (AIAG) publication:, available at www.aiag.org.

8.4.8. A **Ballooned Print** should be included, identifying the attributes that are being measured. It is acceptable to use the same print as for the PAR (Print Attribute Report), provided that the identification numbers match properly. However a separate print for the Control Plan may be necessary for clarity. A supplier generated print may be used for the control plan ballooned print, provided that the supplier print accurately matches the requirements of the Climate Control print.

8.4.9. A **Process Flow Chart** visually illustrates the process that is controlled by the Control Plan.

8.4.10. A **Process Failure Modes and Effects Analysis** is required for CTQ submissions when a Design Failure Modes and Effects Analysis (D-FMEA) is provided by Climate Control. If the supplier is responsible for the design of the part and Critical to Quality characteristics are identified, then the supplier is responsible for submitting both a D-FMEA and a P-FMEA.
For more information on completing the Process Failure Modes and Effects Analysis, please consult the Chrysler, Ford and General Motors Potential Failure Mode and Effects Analysis manual, available from the Automotive Industry Action Group, www.aiag.org.

8.5. **Families of Parts** – A Control Plan or any of its components may be completed for a family of parts, provided that it is specific enough to define all control items required by the part.

9. Initial Process Studies

9.1. **Overview & Samples** – Initial Process Studies evaluate the performance of the process itself, when the process is being operated under a state of statistical control. Climate Control encourages all suppliers to utilize this and other statistical tools to develop and maintain robust processes that are capable of consistently providing high quality parts. The Quality Manager at the receiving location may request that the supplier submit the actual measured samples for the initial process study. If so, these parts should be segregated and clearly labeled to correspond to the numbered results (e.g. 1, 2, 3, 4, etc.).

9.2. **Submittal Requirements** – **When is an Initial Process Study required?** – Submittal of the Initial Process Study module is required based upon the type of SVPP Package, according to the following guidelines:

Submission requirements for Initial Process Studies	SVPP Package Type	
	BASIC	CTQ
Process Studies on Critical to Quality characteristics	*N / A*	**REQUIRED**
Process Studies on Standard characteristics	*optional*	*optional*

9.2.1. **Basic SVPP Package** – If Critical to Quality characteristics **are not present**, an Initial Process Study is not required, but the supplier is encouraged to evaluate their process(es) through the use of statistical techniques such as Initial Process Studies.

9.2.2. **CTQ SVPP Package** – If Critical to Quality characteristics **are present**, the supplier shall conduct an Initial Process Study on each Critical to Quality characteristic, per the guidelines outlined in this document.

9.2.3. **Upon Request –** At times Climate Control Technologies may request a current process study for specific cases, based on on-going production. This evidence may be requested in situations such as: long production runs between SVPP submissions, problem resolution, and others. These requests from Climate Control should be in writing, should allow the supplier a reasonable amount of time to fulfill, and should not be punitive in nature.

9.3. **Quality Index Value Requirement** – The Initial Process Study shall result in a Quality Index value of 1.33 or greater, as calculated by the methods outlined in the sections below.

9.4. If the Quality Index Value is not met, then **PRIOR TO SUBMITTING THE SVPP PACKAGE**, the supplier shall submit a detailed plan for improving the process. The goal of this plan shall be to improve the process, as evidenced by the Quality Index. Plans with the goal of improving the Quality Index Value will be rejected.

9.4.1. The plans must include the following elements:

9.4.1.1. Detailed description of planned actions.

9.4.1.2. Completion dates for each action.

9.4.1.3. Plan for interim zero defect Acceptance Sampling until all issues are resolved. This plan should be implemented per Mil-STD-1916 or equivalent.

9.4.1.4. Commitment date for resubmission of the initial process study.

9.4.2. This plan must have prior approval by the following parties or their designated representative.

9.4.2.1. Quality Manager at the receiving location.

9.4.2.2. Engineering.

9.4.2.3. Supply Management

9.4.3. Upon completion of corrective actions and in accordance with the planned schedule (see above), the process study shall be resubmitted to Climate Control for approval.

9.5. **Calculation of Initial Process Studies** – **Variable Data** – When the measurement of the Critical to Quality characteristic (with two-sided specifications) results in a normal distribution, one of the following methods shall be used to calculate an index value.

9.5.1. **Standard: Ppk** – For processes that meet the required specifications, a performance index (Ppk) is calculated to assess the total variation in the process. This study is conducted based upon the following guidelines:

9.5.1.1. Sample size of 30 pcs minimum.

9.5.1.2. Ppk calculation is based upon calculated sample standard deviation. See Appendix A for complete formula.

9.5.2. **Optional Alternative: Cpk** – For processes that have demonstrated stability through sufficient data and control chart evidence, a capability index is calculated. For more information on acceptable methods of calculating a capability index, please reference the Automotive Industry Action Group (AIAG) publications titled "Production Part Approval Process" and "Statistical Process Control – SPC," available at www.aiag.org.

9.5.3. **Format** – There are many statistical software programs available that are effective in calculating quality indices. The supplier may submit the Initial Process Study using any format that is clear and contains all of the required data. If the supplier does not have access to a software package, Climate Control Form (743F00-005) is available for calculation of Ppk on a 30 piece sample.

9.6. **Calculation of Initial Process Studies** – **Special Cases –** When special cases arise, such as attribute data, low volume production, non-normal distribution, or others that do not fit into the above guidelines, the supplier shall submit a plan for evaluating their processes.

9.6.1. This plan shall be submitted prior to production,

9.6.2. The plan shall be sent to the Quality Manager at the receiving location and the appropriate buyer or Supply Management representative, for approval. The supplier shall obtain written approval for the plan before submitting the results as part of an SVPP package.

9.6.3. The plan shall be submitted early enough to allow for Climate Control approval without affecting the delivery of the purchased items.

9.6.4. NOTE: Special Cases do not result in reduction or dismissal of the requirements for Initial Process Studies. In many instances, special cases will result in more rigorous requirements.

10. Measurement System Qualification

10.1. **Overview & Submittal Requirements –** The **Measurement System Qualification (MSQ)** module is intended to provide documentation that the supplier has all necessary equipment, procedures, processes and other capabilities to ensure the complete and accurate completion of all SVPP requirements. The supplier shall control the calibration of all measuring equipment regardless of submission requirements. However, submittal of the Measurement System Qualification documentation is required based upon the type of SVPP Package, according to the following guidelines.

Submission requirements for Measurement System Qualification documentation	SVPP Package Type	
	BASIC	CTQ
Gauge Calibration	*Upon Request*	*Upon Request*
Gauge Correlation	*Upon Request*	*Upon Request*
Gauge Repeatability and Reproducibility (GR&R)	*Upon Request*	**REQUIRED**

10.2. **Gauge Calibration** – Evidence of calibration and control of all metrology equipment used to measure or verify the quality of product being shipped to Climate Control. These certifications must provide traceability to National Institute of Standards and Technology (NIST, www.nist.gov) or other equivalent national or international standards. This includes equipment at the supplier, sub-supplier or other outsourced metrology equipment or outside laboratory. Climate Control's supplier can provide documentation, as proof of verification, from the sub-supplier they are using, however, the supplier assumes all responsibility associated with their sub-supplier documentation. (Lab testing may include, but is not limited to, chemical, metallurgical, mechanical, electrical, hydraulic, pneumatic and/or other performance testing.)

10.3. **Gauge Correlation** – Gages and measurement systems should be correlated to one another if measurements are to be duplicated with separate gages.

10.4. **Gauge Repeatability & Reproducibility (GR&R)** – A gage repeatability and reproducibility study should be performed to ensure that the gage is appropriate for the part & tolerances being measured. For required submissions (CTQ), the GR&R results must be current, but may be copies of recently completed studies, provided they are less than one year old.

10.4.1. For continuous data, total GR&R less than 10% and 5 or more distinct categories (a.k.a. discrimination index) indicates an acceptable gage. Total GR&R from 10-30% or 2-4 distinct categories indicates a marginal gage. Additional measurement system improvements and review is required. The supplier should consult with the Quality Manager at the receiving location to understand what further activities or requirements may be needed. Total GR&R greater than 30% or 1 distinct category indicates an unacceptable gage. In this case, the measurement system must be reworked and the GR&R study performed again after improvements have been made.

10.5. **Submissions "Upon Request"** – Upon request by Climate Control, the supplier shall submit evidence of Measurement System activities, including those items listed in the *Overview* section and any other activities that the supplier is utilizing to ensure the compliance and stability of their measurement systems.

10.5.1. It is Climate Control's responsibility to request this documentation in writing (email, hard copy, etc.), if it was not originally specified on the Purchase Order or equivalent paperwork. For example, it may be required for all parts from a certain supplier, for selected parts, or only upon request.

10.5.2. Climate Control reserves the right to request this documentation at any time from the beginning of the project through the end of the period for record retention.

10.5.3. Upon request by Climate Control, the supplier is allowed a maximum of 5 business days to submit the required documentation. Therefore, if the supplier has a change or addition in equipment, procedure, process or other capability related to SVPP submission, the MSQ package should be immediately updated.

10.6. For more information, reference: ASQC/AIAG, *Chrysler, Ford and General Motors Measurement Systems Analysis-MSA*, 3rd edition, (Southfield, MI: Automotive Industry Action Group), available from www.aiag.org.

11. Outsourced Design Documentation

11.1. **Overview & Submittal Requirements –** The Outsourced Design Module is required whenever the supplier has responsibility for any or all of the part design. This module provides engineering documentation for all of the work involved in the project. Where applicable, it includes, but is not limited to, the following documents. Submittal of this module is required upon request at the discretion of Climate Control (due to the varied number and types of components.) It is Climate Control's responsibility to request this documentation in writing (email, hard copy, etc.), if it was not originally specified on the Purchase Order or equivalent paperwork. For example, it may be required for all parts from a certain supplier, for selected parts, or only upon request. Climate Control reserves the right to request this documentation at any time from the beginning of the project through the end of the period for record retention.

Submission requirements for Outsourced Design documentation	SVPP Package Type	
	BASIC	CTQ
Design Records	*Upon Request*	*Upon Request*
Engineering change documents / documentation	*Upon Request*	*Upon Request*
Engineering Approvals	*Upon Request*	*Upon Request*

11.2. **Record Retention -** The supplier must retain the engineering and design documentation for a period of five years after the last receipt of parts and approval by Climate Control. Included in this retention must be all documentation for the entire related family of parts. Therefore, the required retention time for initial documentation may be more than five years.

12. Acceptance of the SVPP Package

12.1. The SVPP Package will be reviewed at the receiving plant (or by designated representative) to ensure the product provided meets the required specifications.

12.1.1. If the report and samples are reviewed and deemed acceptable, the lot will be accepted through the receiving function at the plant.

12.1.2. If the report and samples are reviewed and found inadequate, the lot will be rejected and the supplier will be instructed to correct the discrepancies immediately. Upon correction of the discrepancies, a new SVPP Package (with new sample parts) will need to be completed and resubmitted for review to the receiving plant. **Climate Control does not grant conditional approvals. Parts are approved, rejected or received under a Material Deviation Authorization.**

12.2. The following are examples of items that shall result in a rejection of the SVPP Package:

- Supplier has not completed all requirements listed on the SVPP Part Submission Warrant or in this document.
- Non-conformance of samples to drawing or engineering specifications.
- Incomplete or incorrect or inaccurate documentation.
- Incorrect sample size or failure to properly identify samples.
- Initial Process studies that do not meet the minimum criteria for Critical to Quality Characteristics (CTQ's), when CTQ's are present and the minimum criteria are defined.
- Incomplete control plan.
- Failure to provide Outsourced Design Documentation upon request.
- Lack of complete Measurement System Qualification documentation.
- Other omissions, non-conforming items or similar issues.

12.3. Approval of the SVPP Package will result in the acceptance of the lot through the plant receiving function. Upon acceptance of the SVPP package, the receiving plant will return a copy of the completed Part Submission Warrant via the fax number listed by the supplier on the form.

12.4. The supplier shall be required to keep a copy of the SVPP Package for the life of the part and any report shall be made available for review within 1 business day, upon request by Climate Control.

12.5. Re-submittal of rejected SVPP Packages will require a re-submittal of a complete SVPP package, including re-measurement of ALL required data. This also includes ALL associated assembly components. For example, resubmission of a sub-component will also require complete resubmission of the assembly that it occurs in. These re-submittals should be submitted in the same fashion as the original reports. A copy of the rejected SVPP Package shall also be included in the re-submittal package with the rejected items highlighted.

12.6. General statements indicating that the parts conform to the specifications ARE NOT ACCEPTABLE (i.e. Certificates of Conformity). Any shipment and/or report that contains this type of information will be immediately rejected and be subject to the material review process. If suppliers do not have access to the equipment needed to supply this information, outside sources (such as metrology or inspection laboratories) shall be employed at the supplier's expense to obtain a completed report. If the nature of the part prohibits a select number of attributes from being recorded completely, the supplier shall ask for a deviation of the requirements in advance of SVPP submission or the parts may be rejected.
Note: At times, Certificates of Conformity from the original manufacturer may be necessary and acceptable for verification of certain specific attributes. (i.e. material C of C's) Please contact the Quality Manager at the receiving plant to determine what is acceptable for specific cases.

12.7. It is Climate Control's expectation that any non-conformances to the specifications must be corrected prior to shipment, unless a Material Deviation Authorization (MDA) from the plant Buyer/Planner or Plant Quality has documented prior approval to ship.

12.8. Submitting SVPP Packages with non-conformances ("FYI" reports) without prior approval will be cause for immediate rejection of the report and the associated parts.

12.9. Requests to change a drawing must be made, in writing, in advance of a submittal. The preferred method is by email. If email is unavailable, a written document (fax or mail) will be acceptable. Drawing changes shall be directed to the Supply Manager or that Supply Manager's designated representative. Each request shall contain as a minimum:

- Part number/Drawing number
- Revision level of part/drawing
- Reason(s) for the requested change(s), with supporting data as necessary
- Any other supporting documentation that supports the requested change should be included in the written notice.

12.10. If a dimension(s) is out of tolerance or pending a drawing review, this should be noted in the "Deviations/Comments" box on the PSW by indicating a "yes" or "no", attaching supporting details and submitting for consideration with your report.

12.11. The SVPP Package, including sample parts are to be clearly labeled. Sample parts are to be included with the SVPP Package and sent to the appropriate receiving plant for review. The contents of the package containing the SVPP Package and samples shall be marked as follows:

- Climate Control, {*NAME OF RECEIVING PLANT*}
- {*ADDRESS OF RECEIVING PLANT}*
- Attention: Quality Department
- Contents: SVPP Package & Samples for P/N {*ENTER PART NUMBER}*

13. Sub-Supplier and Sub-Component Requirements of the SVPP Package

13.1. Climate Control will require SVPP for ALL parts with a Climate Control drawing associated with the component, regardless of design ownership. The SVPP program includes components with Climate Control drawings purchased by a supplier to complete a Climate Control assembly. These parts will be referred to as *sub-components* and the makers of these parts as *sub-suppliers.*

13.2. It is Climate Control's expectation that Suppliers shall assume all responsibility and accountability of managing their sub-suppliers for quality, delivery and performance in meeting Climate Control's specified requirements.

13.3. The Supplier is responsible for the quality of parts manufactured and/or assembled specifically for Climate Control AND for those components/sub-components provided by sub-suppliers in any finished assembly.

13.4. The Supplier shall obtain all necessary documentation from their sub-supplier(s) that is required to complete the SVPP Package. The Supplier may do this by either having the sub-supplier complete the request or by internal inspection at the Supplier.

13.5. SVPP Packages are to be sent by the Supplier only, not the sub-supplier. (though Climate Control reserves the right to request SVPP Packages directly from a sub-supplier if the situation warrants such activity.) The supplier is responsible for conveying/forwarding any pertinent information to their sub-suppliers. Instances where proprietary information may be compromised by this requirement will be dealt with on a case-by-case basis.

Appendix A – Formula for Calculating Ppk

A This calculation is based upon the calculated sample standard deviation. (This differs from the estimated standard deviation used in Cpk calculations):

A.1 Definition of Terms

Ppk = Process Performance Index
USL = Upper Specification Limit
LSL = Lower Specification Limit
$\overline{\overline{X}}$ = The calculated average of the sample values
σ_i = The calculated standard deviation on the sample values
n = Number of samples
x_i = Sample value
$\overline{x}$ = Sample average

A.2 Calculation of Ppk

$$Ppk = \frac{Z_{\min}}{3}$$

where Z_{min} = The smaller value of Z_{upper} and Z_{lower}

$$Z_{upper} = \frac{\left(USL - \overline{\overline{X}}\right)}{\sigma_i}$$

$$Z_{lower} = \frac{\left(\overline{\overline{X}} - LSL\right)}{\sigma_i}$$

A.3 Calculation of Standard Deviation (based on actual data).

$$\sigma_i = \sqrt{\sum \frac{\left(x_i - \overline{x}\right)^2}{n-1}}$$

Appendix B – Definitions

B.1. Acceptance Criteria (Acceptance Requirements) – Requirements that define dimensions, characteristics, attributes, etc., which must be present for the part to be accepted. Process / Processing instructions are not included in acceptance criteria, unless they can be verified on the actual part or purchased product.

B.2. Attribute *(or Print Attribute)* – Any information, traits, features or characteristics on the print or applied specification that defines the part in whole or in part. The attributes combine to define the form, fit, function, performance and other related characteristics of the part. This also includes, but is not limited to, specifications that are defined by Thermo King Engineering Specifications (TKS's) and Hussmann Engineering Case Specifications (ECS's). Unless otherwise noted, the definition of "attribute" in this document encompasses all specifications, both dimensional and non-dimensional.

B.3. Attribute Data – "**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" (ASQC/AIAG**, *Chrysler, Ford and General Motors Production Part Approval Process (PPAP),*** 3rd edition, Southfield, MI: Automotive Industry Action Group, 87). "Attribute data" is differentiated from an "attribute," where "attribute refers to a characteristic of an object and "attribute data" refers to a kind of binary data. For reference, see also: *Variable Data*.

B.4. Catalog Part – Also known as "off-the-shelf," "commodity" or "standard" items. These are parts that are standard product for the given supplier. They are sold publicly, or as a portion of assemblies to other customers and are not unique or exclusive to Climate Control.

B.5. Climate-Control Technologies (Climate Control) – The name of the Ingersoll Rand sector that includes Hussmann, Koxka, Krack and Thermo King brands. For simplicity sake, these companies will be referenced as "Climate Control."

B.6. Critical to Quality Characteristics – Please reference TKS 18005 for more information on Critical to Quality Characteristics (CTQ's). Generally the one of the following annotations, as appropriate, will represent CTQ's.

Classification	**Means of Identification** (Characteristics may be identified on prints or other purchasing documentation via any of the flowing methods.)		
Key Characteristic		<K>	Use of the term "Key Characteristic" or equivalent, which unmistakably identifies the characteristic as a "Key Characteristic."
Safety/Compliance /Legal Characteristic		<S>	Use of the term "Safety/Compliance/Legal Characteristic" or equivalent, which unmistakably identifies the characteristic as a "Safety/Compliance/Legal Characteristic."

B.7. Part – The object of a purchase order. This may include physical components, services, intellectual property, etc.

B.8. Process Failure Modes and Effects Analysis – "An analytical technique used by a Manufacturing/Assembly-Responsible Engineer/Team as a means to ensure that, to the extent possible, potential failure modes and their associated causes/mechanisms have been considered and addressed. In its most rigorous form, an FMEA is a summary of the team's thoughts (including an analysis of items that could be go wrong based on experience) as the process is developed." **(ASQC/AIAG, *Chrysler, Ford and General Motors Potential Failure Mode and Effects Analysis,* 3rd edition, Southfield, MI: Automotive Industry Action Group, 35)**

B.9. Reject Criteria – The opposite of Acceptance Criteria. These are conditions that, if present, will cause the part to be rejected. Examples of Reject Criteria are scratches or dents. Documentation of the *absence* of reject criteria is generally not required on the SVPP. However, the presence of reject criteria will result in rejection of the part and / or SVPP Package.

B.10. Sub-components – Those components for which Climate Control has a drawing that are purchased by a supplier to complete a Climate Control assembly

B.11. Sub-supplier – The Company with whom the Supplier has issued a purchase order.

B.12. Supplier – The Company with whom Climate Control has issued a purchase order.

B.13. Variable Data – "**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" (ASQC/AIAG, *Chrysler, Ford and General Motors Production Part Approval Process (PPAP), 3rd edition*, Southfield, MI: Automotive Industry Action Group, 92).

REVISION HISTORY

Rev	*Date*	*Description*	*Requester*
A	04/26/02	Initial Release	B. Pierskalla
B	12/16/04	Updated for structure and requirements to meet current practices.	T. Rosenberg
C	1/24/06	Significant Update to add requirements for Control Plans, Initial Process Studies and other.	T. Rosenberg