

ENGINEERING  
TOMORROW

*Danfoss*

Revision 9.6 - 503U0016

# Danfoss **Supplier Quality** Manual

January 2021



<b>1. Introduction</b>	<b>4</b>		
<b>2. Purpose</b>	<b>5</b>		
<b>3. General Requirements</b>	<b>5</b>		
3.1 Quality Targets	6		
3.2 Quality Improvement Plan (QIP)	7		
3.3 Organization Knowledge & Competency	7		
3.4 Communication	8		
<b>4. Supplier Qualification</b>	<b>8</b>		
4.1 Quality Management System (QMS)	8		
4.2 Danfoss Supplier Audits	9		
4.3 Danfoss Supplier Qualification Processes	9		
4.4 New Product Development	10		
<b>5. Production Part Approval Process (PPAP)</b>	<b>11</b>		
5.1 Sample Products and Master Sample	13		
5.2 Dimensional Results	14		
5.3 Material, Performance and Reliability Test Results	14		
5.4 Appearance Approval Report (AAR)	14		
5.5 Special Characteristics	14		
5.6 Process Capability Studies	16		
5.7 Measurement System Analysis (MSA)	18		
5.8 Process Flow Diagram	19		
5.9 Failure Mode and Effects Analysis (FMEA)	19		
5.10 Control Plan (CP)	19		
5.11 Process Audit	20		
5.12 Certifications, Certificates and Code Requirements	20		
5.13 Early Production Containment (EPC)	21		
5.14 Requalification	21		
<b>6. Non-conforming Products</b>	<b>21</b>		
6.1 Reimbursement	21		
6.2 Control of Non-conforming Products	21		
		6.3 Immediate Containment Actions due to Non-conformances Identified after Shipment	22
		6.4 Immediate Containment Actions due to Non-conformances Identified before Shipment	23
		6.5 Corrective and Preventive Actions	24
		6.6 Controlled Shipping Level (CSL1 and CSL2)	25
		<b>7. Supplier Monitoring and Development</b>	<b>25</b>
		7.1 Supplier Monitoring	25
		7.2 Supplier Development	26
		7.2.1 Top Worst Supplier Management Program	27
		<b>8. Change Management</b>	<b>28</b>
		8.1 Changes Initiated By Suppliers	28
		8.2 Changes Initiated By Danfoss	29
		<b>9. Identification, Traceability &amp; Quality Records</b>	<b>29</b>
		<b>10. Health, Safety and Environmental Requirements</b>	<b>31</b>
		10.1 Environmental Management System (EMS)	31
		10.2 Health and Safety Management System	31
		10.3 Product Compliance	31
		<b>11. Danfoss Property Maintenance</b>	<b>32</b>
		<b>12. Code of Conduct (CoC)</b>	<b>32</b>
		<b>13. Risk Management / Contingency Planning</b>	<b>32</b>
		<b>14. Supplier's Liability</b>	<b>33</b>
		<b>15. Definitions, Abbreviations and Links</b>	<b>33</b>
		<b>16. Reference Materials</b>	<b>38</b>
		<b>17. Templates</b>	<b>38</b>
		<b>18. Changes in relation to previous issue</b>	<b>39</b>

# 1. Introduction

With our Going Great strategy, we are driving long-term value creation for our customers, partners, employees and other stakeholders.

We play a significant role in the green transition towards lower carbon emissions and more electrification, making the world's energy consumption more sustainable.

This is demonstrated by combining our application know-how and innovative engineering to create smart sustainable solutions.

With uncompromized focus on **quality, reliability and innovation**, we support our customers' expectations for best-in-class solutions.

To stay ahead of the curve, we aim at further strengthening our relations and partnerships with our key suppliers. It is essential that we share the same aspirations for a Zero Defect mindset, continued improvements and sustainable products and processes.

This Supplier Quality Manual describes the expectations, requirements and standards for you as a Danfoss' Supplier. It is crucial for every business relationship with Danfoss and is an integral part of each purchasing agreement concerning goods and services, our business practices, environmental requirements and labor welfare.

Quality is a team effort. As a supplier, we value your contribution as business partner and we recognize your role as key to achieve excellent performance. Together, we can develop and maintain a strong and successful partnership.

Thank you for your continued support!

**Ralf Havermann**  
Senior Vice President  
Danfoss Procurement

# 2. Purpose

This Supplier Quality Manual sets the rules, standards, and requirements for Danfoss' Suppliers to meet Danfoss expectations. These are also applied when Danfoss screens new potential Suppliers, including suppliers, that produce finished products on behalf of Danfoss, which are categorized as Branded and Traded Products.

# 3. General Requirements

All Products and Services shall comply with Danfoss specifications and requirements.

Danfoss has an expectation of Zero Defect on all Products and Services delivered from Suppliers. Suppliers are responsible for ensuring their sub-tier suppliers meet all Danfoss requirements.

In line with our Zero Defect goal, the Supplier and its sub-tier suppliers are required to:

1. Demonstrate compliance with:
  - A. Design, performance, reliability, and applicable legal requirements,
  - B. Process controls and capability requirements,
  - C. All provided drawings, specifications and requirements.
2. Explicitly review and understand all requirements provided to the Supplier concerning Danfoss Products and Services. Ensure resources are available to participate in product quality planning as requested.
3. Establish a change control system that reacts to changes in a timely and accurate fashion. In all cases, acquires written approval from Danfoss prior to implementing any change that is detailed in Chapter 8.
4. Danfoss is working in accordance with IATF 16949:2016 requirements. The suppliers should have a continuous improvement program that develops their QMS towards the requirements of IATF 16949:2016.
5. Measure own performance that includes all given and agreed KPIs from Danfoss.
6. Possess expertise and resources to perform effective risk assessment from product development to serial production, to perform effective root cause analysis, and to take corrective and preventive actions.

7. Ensure that its employees, who are involved in quality issue resolution related to Danfoss products, have necessary competences regarding quality tools, including, but not limited to, 8D, 5Why, 5W2H, etc.
8. Notify Danfoss of any potential or actual non-conformance in Products supplied to Danfoss that may affect its safety, form, fit, function, quality, reliability, durability, appearance, delivery, service or its compliance with regulatory and statutory requirements within 1 working day.
9. Ensure that all Danfoss, regulatory, and statutory requirements are flowed down to the entire supply chain.
10. Comply with all its obligations towards Danfoss including, but not limited to:
  - Danfoss Code of Conduct (CoC)
  - Danfoss Negative List
  - Non-Disclosure obligations
  - Customer Specific Requirements (CSR) from Danfoss
11. It is expected that the Supplier sign up for the Supplier Quality Manual (SQM) Alert function <https://www.danfoss.com/en/about-danfoss/company/procurement/supplier-requirements/> in order to receive and engage future updates of the Danfoss Supplier Quality Manual.

Danfoss recognizes Suppliers, that are providing items such as traded goods, catalogue parts and services, may not be able to meet all the requirements of this Supplier Quality Manual. Any exception or deviation to the requirements, terms and conditions of this Supplier Quality Manual, including, but not limited to exceptions or deviations to Danfoss expectations, requires an addendum where the exceptions are documented and approved by Danfoss.

Any Supplier's action that carries cost liability to Danfoss must be authorized by the Danfoss procurement organization.

### 3.1 Quality Targets

In general, Zero Defect is the common expectation and ultimate goal for all Suppliers. It is expected that Zero Defect is achieved throughout the entire product/service lifetime supplied by all suppliers and sub-tier suppliers.

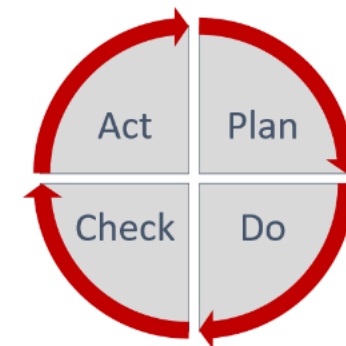
In order to monitor the Supplier's efforts to strive for Zero defects result with continuous improvement logic embedded, Danfoss may define specific quality targets for suppliers to work towards these expectations.

### 3.2 Quality Improvement Plan (QIP)

Supplier shall, without any delays as per Danfoss request, present a QIP to Danfoss that meets the targets and requirements stated in Danfoss' request. A QIP could be initiated as a result of, for example, Danfoss audits, Business Review Meetings, Operational Management Meetings, Quality Performance Review, etc.

It's supplier's responsibility to compile QIP when Danfoss expectations/targets are not met and submit to Danfoss. Supplier's QIP should be based on an analysis of past 12 months failures in order to identify technical, managerial and systemic issues. QIP should cover quality, reliability, logistic, delivery, and service issues, as well as any specific Danfoss requests.

When the QIP has been accepted by Danfoss, the Supplier is responsible for implementing the QIP. The effectiveness of the implemented activities shall on regular basis be evaluated by both the Supplier and Danfoss. The Parties' evaluation may result in amendments of the QIP.



### 3.3 Organization Knowledge & Competency

Suppliers shall define key resources responsible for interacting with Danfoss to conduct business effectively. At a minimum, the following knowledge and demonstrated competencies shall exist within each Supplier's organization:

- Formal problem-solving (e.g. 8D, A3, 5xWhy, Failure Tree Analysis, Kaizen, Six Sigma)
- Quality Management
- Manufacturing Engineering
- APQP or equivalent product quality planning approaches
- Project management for new product development and change management

- Supply Chain Management
- Materials Resource Planning

Suppliers shall be able to demonstrate their employees, who are involved in the processing of Danfoss parts, have the necessary competence, training, education or experience.

There should be resource planning based on the above mentioned knowledge for risk mitigation of employee turnover.

### 3.4 Communication

All formal communications must be in English, unless otherwise agreed with Danfoss, and this rule shall apply to all documents sent by the Supplier.

Supplier shall proactively, directly and effectively involve the Danfoss procurement organization in every communication on all matters affecting Danfoss supply chain processes.

## 4. Supplier Qualification

The Supplier Qualification - Ready for Business - ensures that the Supplier has a documented and an effective management system in place to produce Products and Services fulfilling all Danfoss specifications and requirements, and be capable to continue to improve quality, delivery and cost.

### 4.1 Quality Management System (QMS)

The Supplier must maintain an effective documented Quality Management System that communicates, identifies, coordinates, and controls all key activities necessary to design (if applicable), develop (if applicable), produce, deliver, and service Products and Services to Danfoss.

The Supplier shall be certified/ registered to one of the following international quality management standards by a recognized, independent, and accredited third-party certification/ registration body:

ISO 9001:2015 Quality Management Systems – Requirements  
 IATF 16949:2016 Quality Management Systems – Automotive Requirements  
 Other internationally recognized standard(s) may be accepted, but require written approval from Danfoss.

Note: The Supplier must notify Danfoss if their registration expires and shall send an updated copy of the certificate each time it is renewed within 2 weeks after having received it. The certificate shall be sent to the following Danfoss mailbox: [qcertificate@danfoss.com](mailto:qcertificate@danfoss.com)

Danfoss reserves the right to access all Danfoss relevant certification/registration details of the Supplier.

In addition, Danfoss reserves the right to:

- Conduct its own Danfoss supplier quality audit, at a mutually agreed time with the Supplier;
- Invite customers to participate in relevant audits;
- Disqualify, demote, adjust Supplier segmentation status, requiring full requalification prior to resuming business and / or shipment with Danfoss;
- Notify the third-party certification / registration body used by the Supplier in case of the breach / misuse of its Quality Management System.

### 4.2 Danfoss Supplier Audits

#### 1. Management System Audit

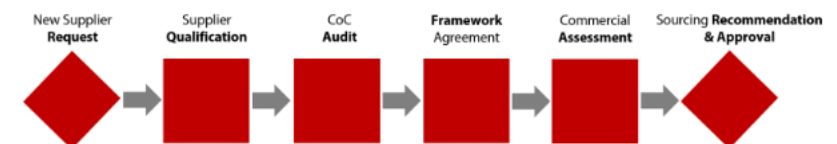
Danfoss is, at all times, entitled to audit the Supplier's Quality Management System. During this management system audit, Danfoss shall have access to all Supplier facilities and supply chain, staff and documents relevant for the Danfoss audit. Any exceptions are to be agreed up front with the lead auditor.

#### 2. Danfoss Code of Conduct Audit

When required, a CoC audit will be conducted as part of Supplier's qualification by Danfoss or a third party at the Supplier's expense.

#### 3. Technology, Process and Product Audits

There may be times where audits of the manufacturing process, product or technology will be needed due to onboarding requirements, projects or non-conformances. When these cases exist, Technology, Process or Product audits will be conducted of the Supplier's facilities and supply chain.





## Process to become a Danfoss Partner

### 4.3 Danfoss Supplier Qualification Processes

The supplier Qualification Process will be followed for following conditions:

- New Supplier Introduction
- New Manufacturing Location of Existing Suppliers
- New Business Award to Existing Suppliers;

Supplier Qualification Process contains, but not limited to, below activities:

- Supplier Qualification/Management System Audit
- Code of Conduct Audit
- Framework Agreement
- Commercial Assessment
- Sourcing Recommendation and Approval if all above activities are finished

### 4.4 New Product Development

Danfoss suppliers are required to have an effective project planning and execution process that is capable of supporting Danfoss process and timing for project management. Project approach shall be utilized throughout the product life cycle by supplier for any product or process changes.

APQP process as defined by AIAG, or equivalent product quality planning approaches, shall be used upon Danfoss request.

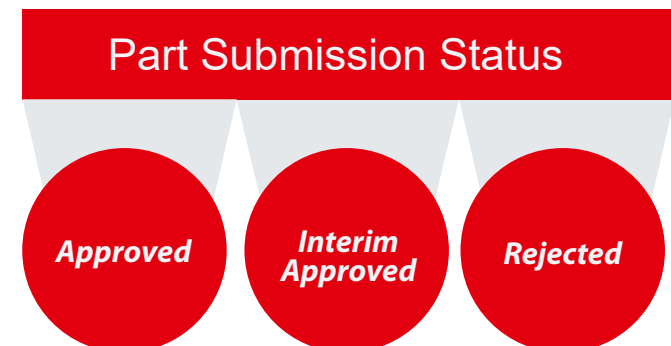
Suppliers developing product-related software for Danfoss, or on behalf of Danfoss, must apply an applicable software development assessment method based on recognized and applicable industry standards to ensure continuous improvements of supplier's software development methods and practices. The assessment method is to be decided by supplier. Assessment method and findings may be subject to audit by Danfoss at the supplier's premises.

## 5. Production Part Approval Process (PPAP)

Production Part Approval Process (reference: latest revision of PPAP Reference Manual by AIAG) ensures that the Product is capable of meeting Danfoss' technical and performance needs. PPAP ensures that the intended specific manufacturing processes are in place, and that the Supplier is capable of producing Products of consistent and required quality expected by Danfoss.

Significant Production Run (SPR) is applicable for new parts introduction and selected change management projects. Product for PPAP shall be taken from a significant production run that usually takes from one hour to eight hours of production (or otherwise agreed with Danfoss) with minimum quantity defined by Danfoss in the PPAP purchase order. The SPR must be conducted using the final version of production tooling, production equipment, production environment including trained operators, production facilities, production gages, and production rates.

Danfoss may conduct SPR/Run@Rate assessment or request it from Supplier. Such an assessment contains, but is not limited to, process capability, first pass yield, production rate and capacity.



PPAP parts submission shall be made by supplier and approved by Danfoss. PPAP shall be scheduled and executed in accordance to a date / timeline, in agreement with all Danfoss sites using the Product.

Unless otherwise agreed with Danfoss in writing, Suppliers shall not manufacture or ship any products, until **Full or Interim Approval is received from Danfoss**, through a signed Part Submission Warrant (PSW).

Unless otherwise agreed with Danfoss in writing, Suppliers shall not manufacture or ship any products, until Full or Interim Approval is received from Danfoss, through a signed Part Submission Warrant (PSW).

In a case where full approval is not granted, the products can be supplied based on a waiver approved/issued by Danfoss. Meanwhile, the non-conformity must be corrected within a time frame agreed by Danfoss, and the process approved by new PPAP submission, if requested by Danfoss, from the Supplier or by revision of the drawings/specifications from Danfoss side.

Danfoss reserves the right to determine if any or all of the PPAP items are to be reviewed on-site at the Supplier's facility, as part of the PPAP process.

In the case of disagreements, concerns or queries about the PPAP, it shall be addressed to Danfoss procurement organization and subject to the final decision of Danfoss.

Due to Danfoss customer requirements, all PPAP documentations and records related to the Product or production shall be retained for a minimum of 15 years and / or for the duration specified by any relevant regulatory requirements.

After PPAP approval, the Supplier shall not make any changes to the Product or process, without approval from Danfoss. In case of such a need for change, the Supplier shall refer to the required process for change request (refer to Section 8 Change Management).

The Supplier shall submit the specified documentation according to Danfoss requirements (to the authorized Danfoss representative as communicated to the Suppliers). If Danfoss requires a PPAP, level 3 shall be used as the default level unless otherwise specified by Danfoss.

Every PPAP submission shall be verified according to the latest revision of Danfoss Negative List by supplier.

Regardless if a PPAP submission is required by Danfoss, the Supplier shall fulfill the PPAP requirements and retain relevant documentation as evidence unless otherwise specified by Danfoss. A PPAP shall be provided for each part / family in the approval process. Danfoss reserves the right to ask for applicable PPAP elements, even after PPAP approval, which are not submitted during initial PPAP review.

A table of PPAP elements is shown in Section 15 (Definitions, Abbreviations and Links).

In the case of business discontinuation (reflected as termination, expiration, or completion of any supply agreement or purchase order), the supplier is obliged to submit all the requested documents and records.

## 5.1 Sample Products and Master Sample

The Supplier shall:

1. Provide the required number of sample products, as specified in the PPAP order. All products are to be produced consecutively in the Supplier's production. In some cases, the PPAP order may also require a 2<sup>nd</sup> production run in order to capture variation in the Supplier's process.
2. Complete the dimensional and performance test reports, as required, along with the required sample products;
3. Retain master sample products for the same period as the PPAP records, unless otherwise agreed with Danfoss;
4. Identify the master sample products as such and with a label or marking of the Danfoss approval date on the sample.
5. For PPAPs done specifically for items such as labels and packaging, the PPAP Order may take into consideration the need to reduce some of the requirements listed above. However, all needed requirements will be listed on the PPAP Order.

For detailed requirements, the Supplier shall take reference to latest revision of PPAP Reference Manual by AIAG and shall consult with Danfoss for any questions or clarifications.

## 5.2 Dimensional Results

The Supplier shall submit all data electronically, unless otherwise agreed. Actual variable data must be provided in terms of measurements, except for attribute data (pass/fail; go/no-go; nominal or ordinal, etc.). All results must be traceable to the specific samples submitted by the Supplier and shall include appropriate references to the equipment used and to the procedures used for the measurement, if applicable.

## 5.3 Material, Performance and Reliability Test Results

The Supplier (or a qualified independent third party) shall provide specific material, performance and / or reliability test results. Actual results must be compared against agreed upon specifications. For certain parts, Danfoss may require third party testing.



All independent laboratories used for inspection, test, or calibration services by Supplier, shall be approved in writing by Danfoss, and shall be accredited to ISO/IEC 17025, or equivalent national requirements, subject to verification by Danfoss.

## 5.4 Appearance Approval Report (AAR)

Danfoss may require an Appearance Approval Report (AAR) along with representative sample part(s) to be submitted, wherever applicable. An AAR is typically requested for an item, which is exposed to view on the exterior of a finished unit. If an AAR is specified on the PPAP Checklist, the Supplier shall contact Danfoss (only the authorized Danfoss representative, as communicated to Supplier) to ensure the requirements are clearly understood and formally agreed.

## 5.5 Special Characteristics

A Special Characteristic is any feature of a material, process, part, assembly, or test that has a significant influence on Product fit, form, function or any other expected deliverable, as specified by Danfoss. Danfoss will select or identify the Special Characteristics, which the Supplier shall control. Special Characteristics will be communicated through:

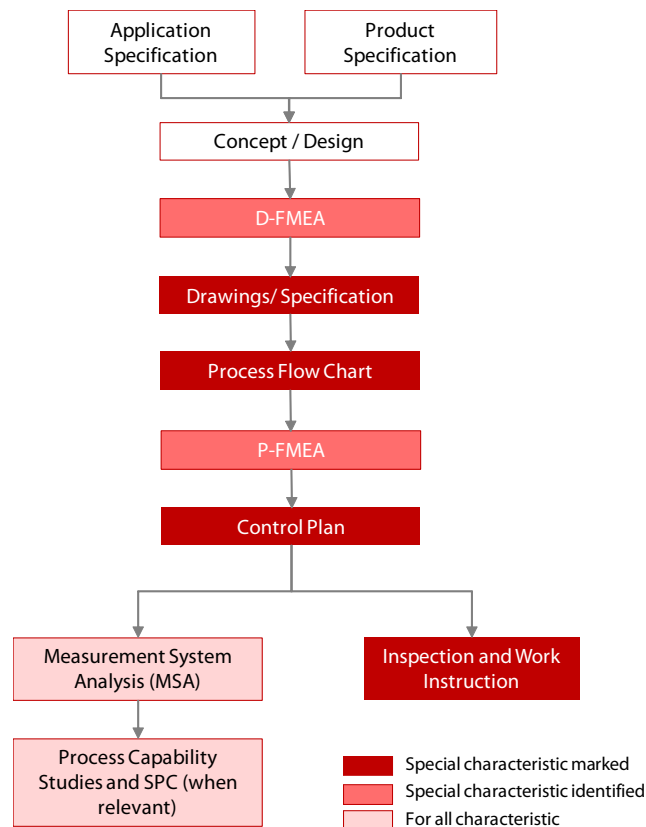
Special Characteristics	Consequence	Acceptable Control Methods
<p><b>Critical (Safety) Characteristics</b></p> <p>Example of graphical marking:</p>  <p>or "S" (or placed in a pentagon)</p>	<p>Lead to safety issues, violation of regulatory/statutory regulation</p>	<p>Error Proofing during production (Poka Yoke)</p> <p>100% inspection after production by:</p> <ul style="list-style-type: none"> <li>• Automatic detection</li> <li>• Manual inspection using go and no go gages</li> </ul> <p>Manual inspection using instruments</p>
<p><b>Key (Significant) Characteristics</b></p> <p>Example of graphical marking:</p>  <p>(or with two lines added) or "F" or "P" (or placed in a pentagon) or "K" placed in a pentagon.</p>	<p>Major disruption at Danfoss production or loss of primary functions at the customers.</p>	<p>Error Proofing during production (Poka Yoke)</p> <p>Statistical control if initial process capability is demonstrated (<math>Cpk \geq 1,67</math>)</p> <p>100% inspection after production by:</p> <ul style="list-style-type: none"> <li>• Automatic detection</li> <li>• Manual inspection using go and no go gages</li> <li>• Manual inspection using Instruments</li> </ul> <p>Alternative method approved by Danfoss Supplier Quality</p>

Notations and/or symbols documented on Danfoss engineering drawings, specifications, and/or PPAP Worksheet.

Note: Special Characteristics shall also include all relevant regulatory and statutory requirements, but are not limited to such. It is the supplier responsibility to identify and include special characteristics in their drawings, specifications, DFMEA, PFMEA, Control Plan and all process control documents.

Note: It is the responsibility of Supplier to ensure all drawings and specifications used to produce the Product are of the revision from corresponding purchase order.





## 5.6 Process Capability Studies

For all Special Characteristics, an acceptable level of process capability and performance shall be determined prior to production. Based on a capability study analysis, a minimum value of C<sub>pk</sub> (short term) 1.67 and P<sub>pk</sub> (long term) 1.33 is required unless otherwise specified by Danfoss. Any exception must be approved by Danfoss (only the authorized Danfoss representative, as communicated to the Supplier) in writing, and subject to the final decision by Danfoss.

If the required process capability / performance is not met prior to the first production, a corrective action plan and revised Control Plan (Reinforced Control

Plan) shall be developed by the Supplier. This shall be submitted to Danfoss for approval (only the authorized Danfoss representative, as communicated to Supplier). This Reinforced Control Plan will require 100% inspection, or other means, as agreed upon with Danfoss. The corrective actions stipulated in the corrective action plan or the Reinforced Control Plan shall remain in place until capability can be demonstrated to Danfoss, or Early Production Containment (EPC) exit criteria are fully met and sustained.

For attribute data, the Supplier shall propose, for Danfoss approval, a method for evaluating process capability with proper and detailed justification. Danfoss reserves the right to specify the type and nature of the attributes, and the corresponding measurement methodology and instrumentation.

Products used for evaluation of the preliminary process capability study shall be consecutively produced and randomly sampled in the production run for approval parts. The process capability study shall contain a minimum of thirty (30) consecutive parts in total, when applicable. The samples shall be collected in production, when the process is stable (i.e., when no adjustments are being performed) during the production run. Products from each unique production process (i.e., each production cell, line, tool or cavity) shall be evaluated separately. No adjustments or maintenance to the process is allowed during the production run.

The number of Products used for a preliminary process capability is defined in the table below. In case of Products used for high volume production, Danfoss (only authorized Danfoss representative, as communicated to Supplier) may require one hundred twenty-five (125) consecutive pieces to be used for the preliminary process capability.

No. of Process Flows or Cavities	Random Sample Size (n)
= 1	n ≥ 30 pieces or pieces specified on PPAP Order*
≥2 ≤3	n ≥ 25 pieces per cavity
≥4 ≤50	n ≥ 50 pieces (cavity x cycles => 50) but minimum 5 cycles
> 50	n = minimum 5 cycles

\* The quantity of pieces can be reduced in such cases, but not limited to, high cost to manufacture Product or annual volume is less than suggested sample size requirements. Instruction will be given on the PPAP Order.

## 5.7 Measurement System Analysis (MSA)

A Gage Repeatability and Reproducibility (Gage R&R) study measures the total repeatability and reproducibility of a gage system as a percentage of the total specification. Measurement System Analysis (MSA) studies ensure the total system variation (including Gage R&R) of a measuring system as a percentage of the total part and process variation.

Danfoss requires Gage R&R and MSA for all variable gages that are used to monitor Special Characteristics.

Number of Distinct Categories (NDC) is optional and depends on Danfoss and/or Danfoss customer's demands.

Attribute gages that are used to monitor Special Characteristics must also undergo applicable gage studies. The method used shall be formally agreed upon in advance between Danfoss and the Supplier.

Acceptance Criteria for MSA Study		
Number of Distinct Categories (ndc)	Gage R&R	Status
ndc $\geq$ 5	GR&R = < 10 %	The measurement system can be approved.
2 = < ndc < 5	10 % < GR&R = < 30 %	The measurement system can be approved if Danfoss accepts the measurement uncertainty. Corrective actions may be required by Danfoss.
ndc < 2	GR&R > 30 %	The measurement system cannot be approved.

If the gage system fails, the Supplier shall take corrective action to make the gage measurements repeatable and reproducible. A gage shall be proven repeatable and reproducible before it can be used in a capability study or to be used to accept or reject Products.

Danfoss reserves the right to specify the MSA study and methodology, and the Supplier shall comply with and fulfill all Danfoss requirements.

## 5.8 Process Flow Diagram

The Supplier shall have a process flow diagram that clearly describes the production process steps and sequences beginning at material receipt through packaging and shipping, where process steps shall include operations performed by outside sources (such as sub-suppliers for the Supplier). These steps need to be identified within the diagram and are subject to approval / authorization from Danfoss (only authorized Danfoss representative, as communicated to Supplier).

A single process flow diagram may apply to a group or family of Products that are produced by the same processes in the same sequence.

## 5.9 Failure Mode and Effects Analysis (FMEA)

The Supplier is required to develop a Process FMEA and Design FMEA, if applicable, and submit results to Danfoss for approval. The Supplier may be invited to participate in the preparation of a higher level Design FMEA through participation in a Product Development team. Suitable alternative risk analysis means may be used, either in place of or in addition to the FMEA, if approved in advance by Danfoss.

The FMEA is a living document and shall be revised as changes are made to the Product, process and when quality issues are found (FMEAs shall be reviewed and updated, as necessary, as part of the Non-conforming Products process defined in Section 6 of this Supplier Quality Manual).

PFMEA shall include all characteristics and a tooling FMEA, if applicable.

## 5.10 Control Plan (CP)

The Supplier shall prepare a Control Plan, based on the DFMEA and PFMEA for the complete process. This Control Plan shall detail the control and inspection activities that have been implemented to ensure conformity to Danfoss drawings and specifications. Special Characteristics shall be marked with their respective reference number(s) and all other characteristics should be also be included.

The Control Plan is to be identified by Product number, family, and revision level.

The Supplier shall:

- Monitor actual processing of the Product,
- Compare processing to the Control Plan in all aspects,
- Report to Danfoss any changes / deviations from the Control Plan and obtain approval from Danfoss, prior to actual implementation.

The Control Plan is a living document and shall be revised as changes are made to the Product, process and when quality issues are found (Control Plans shall be reviewed and updated, as necessary, as part of the Non-conforming Products process defined in Section 6 of this Supplier Quality Manual).

### **5.11 Process Audit**

Danfoss may require a process audit at the Supplier's manufacturing facility and it will be carried out after mutual agreement with the Supplier. This audit focuses on the specific process quality controls that the Supplier has put in place for the Products being manufactured for Danfoss, as well as Product / commodity specific process requirements. In addition, Danfoss reserves the right to conduct such an audit on the Supplier's sub-tier suppliers.

Such audit shall not relieve the Supplier's responsibility to produce and deliver the Zero Defect expectation to Danfoss.

### **5.12 Certifications, Certificates and Code Requirements**

Danfoss may pass on regulatory or statutory requirements to the Supplier. These requirements may require the Supplier to provide such items as (but not limited to) compliance letters, test results, cleanliness results, or part certifications.

Upon Danfoss request, suppliers should provide material registration reference, so as to facilitate further formal International Material Data System (IMDS) submission that Danfoss might do as per customer requests.

It is the Supplier's responsibility to ensure these requirements are fulfilled and maintained. Upon request from Danfoss, evidence of compliance to these requirements shall be submitted by the Supplier as part of the PPAP or individual shipment.

The Supplier shall notify Danfoss immediately in writing, if there is a change to any of these regulatory or statutory requirements (refer to Section 8 Change Management).

### **5.13 Early Production Containment (EPC)**

Danfoss may require EPC at a Supplier's site, in order to put in place a redundant inspection process to prevent potential non-conformances during the start-up of production after PPAP approval. EPC duration is defined by Danfoss based on ramp-up performance and remaining risks.

### **5.14 Requalification**

Danfoss reserves the right to request Supplier for layout inspection or requalification even after PPAP process and in running production phase.

## **6. Non-conforming Products**

This section outlines the Supplier requirements and responsibilities as a result of non-conforming product due to Supplier's fault. Supplier shall carry out corrective and preventive actions based on mutual discussion between Danfoss and Supplier, but subject to Danfoss' sole and final decision.

### **6.1 Reimbursement**

In order to cover Danfoss' costs related to non-conforming products, the Supplier shall reimburse the product, claim handling, administration costs in accordance with the Danfoss Reimbursement Concept or Framework Agreement (FWA) requirements.

Supplier shall compensate Danfoss any documented, direct loss incurred as a result of Defective Products including, but not limited to, inspection costs, line-stop costs, sorting costs, dismantling and installation costs, freight, import and export duties, charges and taxes. In addition to compensation for its documented loss resulting from the Defective Products, Danfoss is entitled to payment of administration fees. The cost will be reimbursed through an invoice from Danfoss.

### **6.2 Control of Non-conforming Products**

If the product or process is different from what is approved by Danfoss, the supplier shall perform a risk assessment before requesting a waiver and continuing production. Sorting actions and reworks shall be agreed with

Danfoss before execution. Suppliers shall maintain the records to identify the quantity and the way of handling the non-conforming, repaired or reworked products, and identify their delivery lots.

Danfoss applies automatic assembly lines which are very sensitive for Foreign Objects. The supplier shall ensure that Foreign Objects are eliminated from all parts shipped to Danfoss to avoid Foreign Object Damage (FOD). In addition to maintaining compliance with cleanliness specifications, all suppliers must maintain a Foreign Object free environment during machining, manufacturing, assembly, maintenance, inspection, storage, packaging and shipping, as requested by Danfoss. Potential Foreign Objects include but are not limited to burrs, chips, dirt, corrosion and contamination resulting from the manufacturing, assembly, maintenance, processing, cleaning, storage and subsequent packaging of parts.

### 6.3 Immediate Containment Actions due to Non-conformances Identified after Shipment

If non-conforming products are identified after shipment from the Supplier, one or more of the following immediate containment actions shall be initiated, based on mutual agreement between Danfoss and the Supplier.

1. The Supplier shall inspect and sort Products with unidentified status at any defined place (Danfoss, Supplier, Danfoss' customer, or others). All costs incurred will be at the Supplier's expense.
2. The suspected batch / lot / shipment will be retained for one or more of the following actions:
  - A. Supplier's immediate replacement of the Product;
  - B. Return of batch / lot / shipment to the Supplier, with the condition of complete replacement, sorting or rework of the Products, and any other charges incurred, at the Supplier's expense;
  - C. Third-party sorting organized at any site specified by Danfoss, at the Supplier's expense;
  - D. Supplier sorting at Danfoss site, at the Supplier's expense;
  - E. Scrap, loss, and any other additional costs incurred by Danfoss, as a result of Non-conforming Products, are at the Supplier's expense.

It is Supplier's responsibility to deliver high quality products to Danfoss, which is in line with Danfoss' expectation of Zero Defects.

### 6.4 Immediate Containment Actions due to Non-conformances Identified before Shipment

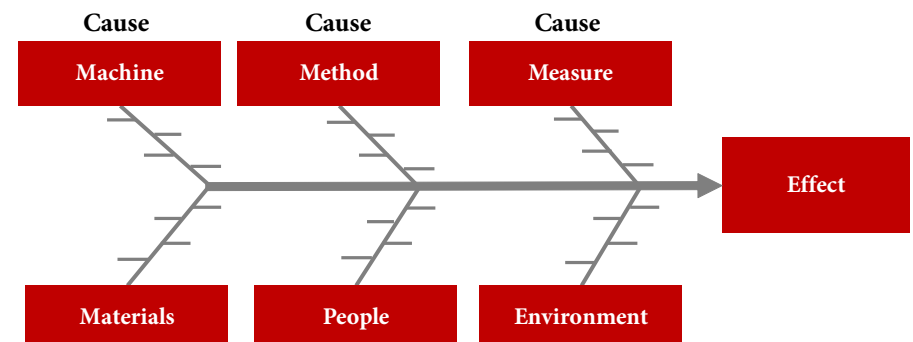
If non-conforming products are identified at the Supplier's site, relevant actions, such as segregation, quarantine, and marking of these products shall be initiated. Non-conforming products shall not be shipped to Danfoss, unless a waiver is granted by an authorized Danfoss representative.

All waivers issued shall specify a specific time and / or quantity limit, which is subject to the sole and final approval of Danfoss.

In the following situations, the Supplier shall immediately notify Danfoss. Danfoss will review the non-conformance and work with the Supplier on an appropriate disposition:

- If the non-conformance affects form, fit, function, quality, reliability, safety, delivery, service of the product, or its compliance with regulatory or statutory requirements, and/or is a cosmetic defect;
- If there is likelihood that the non-conforming product has inadvertently shipped from the Supplier's factory to Danfoss;
- If the non-conforming product is likely to cause late delivery to Danfoss;
- In all cases where there is a report of a non-conformance from another customer, regulatory agency or internally at the Supplier that could possibly affect the form, fit, function, quality, reliability, safety, delivery, service of the product, or its compliance with regulatory or statutory requirements, and/or is a cosmetic defect.

All products approved by a waiver that are shipped to Danfoss must be accompanied by a copy of the approved waiver document.



## 6.5 Corrective and Preventive Actions

When non-conforming products are discovered, the Supplier shall submit a formal written corrective and preventive action report, to address the specific defects identified.

- The general format of the corrective and preventive action will be a Corrective Action Report form (8D), unless otherwise agreed upon in advance by an authorized Danfoss representative. The Supplier shall submit the 8D form for Danfoss' evaluation and acceptance.
- The Supplier shall implement the containment action and submit to Danfoss in writing (steps D1-D3 of the 8D form within 1 working day (starting from Supplier's receipt of the 8D form/non-conformance notification).
- If Danfoss disagrees with the Supplier's containment action, the Supplier must respond (with a revised containment action) within 1 working day (starting from Supplier's receipt of Danfoss' notice).

Failure analysis leading to the root cause determination shall be done within 5 working days (starting from Supplier's receipt of the 8D form/non-conformance notification), and the action plan should be submitted to Danfoss within 10 working days, or at an alternative time-frame agreed upon in advance with Danfoss.

- The Supplier shall use appropriate tools such as, but not limited to, fishbone diagram, 5W+2H, FTA (Factor Tree Analysis) for occurrence and non-detection, LLC (Lessons Learned Cards) to effectively prevent recurrence of the non-conformance.
- The 8D form will not be considered complete until all proposed corrective and preventive actions and an appropriate implementation plan has been approved by Danfoss.
- It is expected that all 8D actions are closed within 20 working days unless otherwise agreed.

Involvement of Danfoss in the approval of remedial action does not change the fact that the Supplier remains responsible for the product non-conformity, including any non-conformities resulting from the implementation of the remedial action. Until the claim has been verified and closed by Danfoss, the Supplier shall adopt all measures to safeguard the interest of Danfoss (and Danfoss' customers).

## 6.6 Controlled Shipping Level (CSL1 and CSL2)

In the event of recurring non-conformances where the corrective action plan has failed, Danfoss reserves the right to issue a Controlled Shipment Level (CSL) program at the Supplier's site (or third party site) for specified Products, and at the Supplier's expense.

CSL1 includes, but is not limited to:

- 100% sorting / inspection on the Products in an area outside of normal in-process inspection, which shall be carried out on every shipment / part / lot / batch, prior to shipment to Danfoss;
- Sorting / inspection records to be attached to each shipment / lot / batch;
- Supply of data and documentation on the products, upon request from Danfoss;
- Visit / audit by Danfoss;
- Dialogue with Supplier's management team, upon request from Danfoss;
- Blocking of shipment, and / or current business, subject to the sole and final decision of Danfoss;

In order to safeguard Danfoss' interest, if there is a failure to successfully achieve CSL1, it will automatically be escalated to CSL2.

CSL2 includes, but is not limited to:

- All CSL1 measures listed above, which will be inspected by a Danfoss-designated 3<sup>rd</sup> party or by Danfoss (at the Supplier's expense);
- Blocking of new business, subject to the sole and final decision of Danfoss.

The Supplier may be notified of additional requirements, when needed by Danfoss.

Exit from CSL1 and CSL2 will be determined by Danfoss, when set criteria are met and corrective actions are implemented and validated.

# 7. Supplier Monitoring and Development

## 7.1 Supplier Monitoring

Danfoss will continuously measure and monitor Supplier's performance based on, but not limited to, the following areas:



- Quality Performance (PPM);
- OPM (occurrence per million)
- Claims Performance (Number and type of claims);
- Costs of Poor Quality (CoPQ) related to supplier non-conformities
- Delivery Performance (On Time Delivery, OTD);
- Service Performance (8D, PPAP, response time, etc.);
- QMS Compliance (ISO 9001:2015, IATF 16949:2016 and other applicable certificates);
- CoC compliance (letters, audits, etc.)

Selected suppliers will receive the Danfoss Score Card on frequent basis. This will support the common understanding of the supplier performance and allows the supplier to take action to address problems and trends before Danfoss may request the supplier to take action.

If in general supplier performance does not meet agreed upon targets, a QIP may be initiated in according with section 3.2 of this Supplier Quality Manual. Depending on the criticality of product/service and progress in solving problems, the Danfoss escalation model can be activated

The monitoring and actions are closely tied to the promoting and demoting of the Supplier's segmentation status within Danfoss' Supplier Management System

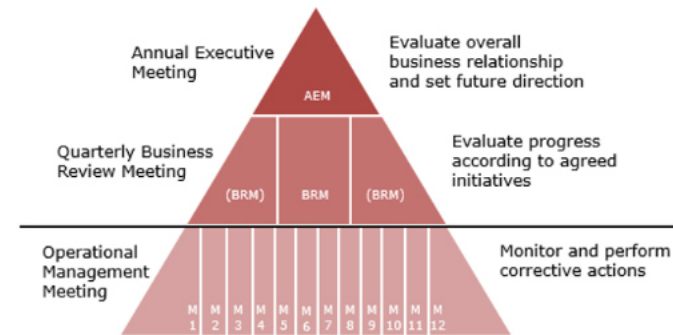
A Supplier's failure to fulfill Danfoss' performance requirements can result in, but is not limited to, new business hold and / or phase-out.

## 7.2 Supplier Development

Suppliers are expected to continuously improve their performance and capabilities to meet Danfoss expectations, by managing risks as well as seeking improvement opportunities. Supplier, who does not meet the performance or capability expectations, or who is business critical for other reasons, may be designated for Danfoss Supplier Development Program.

Danfoss Supplier Development Program for selected suppliers is the anchor for the dialogue regarding but not limited to strategies, outlook, footprint, investment, performance and linked to the supplier development program.

The frequency of meetings depends on Supplier performance or business importance to Danfoss, and range over 3 tiers as example:



- *AEM: Business relationship and direction setting - Senior Management participation.*
- *BRM: Status and evaluation meetings for agreed initiatives.*
- *OMM: Meetings to review and analyze performance to identify improvement actions.*

Suppliers are required to work together with Danfoss to seek for development actions on various levels in the organization, with the goal of improving Supplier performance and capabilities.

### 7.2.1 Top Worst Supplier Management Program

Repeatedly failing to improve or meet Danfoss performance targets may result in Supplier being selected for the Top Worst Supplier Management Program which is summarized as follows with the principal picture of this process:



The criteria to identify those Suppliers into this program are, but not limited to, as defined for Supplier Monitoring in section 7.1.

Supplier performance is measured over the last 6 months and is compared with other Danfoss Suppliers within the same supplier segmentation.

Meetings for this program between Danfoss and the Supplier will be scheduled and requires participation from senior management. During these meetings, the Supplier shall present its analysis regarding its poor performance and its commitment to improving its performance and capabilities in the future. If Danfoss decides there is a need for a process audit or other assessments, it will be carried out by Danfoss within a reasonable time frame.

In the Top worst meeting with senior management participation, the criteria for the Supplier to exit this program will be defined.

If the performance of the Supplier does not improve while being part of this program, Danfoss may take the decision to set new business on hold and / or phase-out the Supplier.

**Inform Danfoss** as early as possible

## 8. Change Management

### 8.1 Changes Initiated By Suppliers

After receiving initial Product approval from Danfoss, the Supplier shall not make any changes to the product and processes which are concerning intended and unintended impact on safety, form, fit, function, quality, reliability, durability, appearance, delivery, service without prior written notification and agreement with Danfoss. Such notification shall be submitted to Danfoss 6 months in advance, or as otherwise agreed with Danfoss. The Supplier shall follow this requirement across its entire supply chain, which includes its sub-tier suppliers.

Changes include, but are not limited to:

1. Any Product changes, including packaging changes;
2. Any material or material composition changes in the Product;

3. Changes to regulatory, statutory or legal status / documentation requirements;
4. Any manufacturing process changes (including testing and inspection):
  - Moving production equipment internally within the facility
  - Moving production equipment to other facilities / locations
  - Change of Product storage location (e.g. warehouse)
  - Change of production process
  - Production material changes
  - Change of process parameters outside of previously approved operating parameters
  - New production equipment
  - Moving products or parts to another supplier(s)
  - New or changed parts purchased by Supplier

Supplier's non-compliance with the above requirements is considered a material breach of the Framework Agreement (FWA) or comparable between the Supplier and Danfoss. For any change, Danfoss reserves the right to requalify the Product with an appropriate PPAP. For all change requests, temporary as well as permanent, the Supplier shall use the Danfoss change request form available at: <https://www.danfoss.com/en/about-danfoss/company/procurement/supplier-requirements/>.

Any change is subject to sole and final written approval from Danfoss.

### 8.2 Changes Initiated By Danfoss

Once receiving Danfoss engineering change notifications, suppliers should complete internal review and provide feedback to Danfoss within 10 working days, or as agreed with Danfoss.

## 9. Identification, Traceability & Quality Records

Special delivery marking/identification of products, that are related to PPAP, waiver, or deliveries other than normal production, shall be applied.

Recording quality information throughout production enables tracing non-conforming Products during problem solving at suppliers, Danfoss and Danfoss customers. Traceability information is required from all production steps which

add value to products, on manufacturing and delivery batch level and per Product serial number when available. The following quality information is required to be recorded by supplier with appropriate data back-up method implemented, and made available to Danfoss upon request:

- Resources used in product manufacturing
- Process parameters, inspection and testing results
- Manufacturing location
- Manufacturing and shipping date and quantity
- Used raw materials (manufacturer, type and manufacturing date)
- Certification data
- Purchase Order number

Additionally for products containing Critical (Safety) or Key (Significant) Characteristics, the following information has to be recorded:

- Product & process special characteristics records
- Rework operations done on parts
- Maintenance activities of production and measuring equipment
- Personnel qualification records

Items requiring traceability shall be identified during the development phase of a project. Where traceability is required, Danfoss will work with the Supplier to develop an acceptable system. The requirements for traceability of relevant items will be communicated to the Supplier through specifications, drawings or PPAP Orders. The Supplier shall retain the appropriate quality records for Product on each shipment to support any requests made by Danfoss.

Supplier's certification, raw material certifications, process, test and / or inspection data shall be provided to Danfoss, upon request, and shall be retained by the Supplier for a minimum of 15 years after delivery of the relevant Products to Danfoss. This requirement does not supersede any regulatory or statutory requirements for records retention.

Certain data may be required to be included with the Product shipment and shall be agreed in advance with Danfoss.

Suppliers are responsible to have inventory control systems that positively identify and control obsolete material to prevent inadvertent shipment to Danfoss. Where feasible, suppliers shall maintain First In First Out (FIFO) inventory management practice. The system for FIFO control must ensure controls extend to rework/repair, test activity and off-site (sub-contract) processes.

Any exceptions should be brought to the attention of Danfoss in writing, for prior approval by Danfoss.

## 10. Health, Safety and Environmental Requirements

The Supplier shall identify all activities that are needed in order to ensure that all Products, (as well as the corresponding Production processes) are in conformance with both legal requirements and requirements specified by Danfoss.

### 10.1 Environmental Management System (EMS)

The Supplier is expected to deploy, and maintain an EMS based on ISO 14001, or equivalent (e.g. EMAS).

Danfoss reserves the right in mutual agreement with the Supplier to audit the Supplier's EMS. During this audit, Danfoss shall have access to all facilities, staff and Danfoss related documents. The Supplier shall submit to Danfoss a comprehensive action plan for agreed deviations identified / found by Danfoss during the audit. The Supplier must execute and manage the improvements.

### 10.2 Health and Safety Management System

The Supplier is expected to deploy, and maintain a health and safety management system based on ISO 45001.

### 10.3 Product Compliance

The supplier shall at all times comply with the most recent version of the Danfoss Negative List and follow Danfoss' RoHS requirements in product specifications and drawings.

The supplier shall on Danfoss request deliver information related to the product compliance <https://www.danfoss.com/en/about-danfoss/company/sustainability/product-compliance/>.

## 11. Danfoss Property Maintenance

All manufacturing tools belonging to Danfoss must be clearly and indelibly marked as the property of Danfoss in a way that they can be identified as such. Additionally, a record for tool life status including the quantity of parts produced from that tool must be maintained, updated and submitted to Danfoss annually or upon request. Supplier must provide to Danfoss the tool documentation and pictures, when requested by Danfoss.

## 12. Code of Conduct (CoC)

Danfoss has a strong commitment to economic, environmental and socially sustainable development. As a result of this commitment, Danfoss has signed up to the principles of the United Nations' Global Compact ([www.unglobalcompact.org](http://www.unglobalcompact.org)) and established a CoC for Suppliers, which includes respect for universally recognized standards for the environment, human rights, labor and anti-corruption.

### Signatures

The Supplier shall sign the CoC Letter and conduct a self-assessment, at the Supplier's expense.

### Audits

When required for suppliers with direct production, CoC audit will be conducted as part of Supplier qualification by Danfoss or a third party at the Supplier's expense. Danfoss also reserves the right to ask for an audit to be conducted at any of the Supplier's sub-suppliers.

## 13. Risk Management / Contingency Planning

The Supplier shall:

- Identify and prioritize risks affecting delivery of Products or Services to Danfoss. This includes virtual risks, for example, Cyber Attack by ransomware.

- Upon request, provide Danfoss with proper contingency plans for the highest ranked risks to ensure un-interruption of delivery.

For those risks, which will lead to up to 2 weeks shutdown of production, Danfoss reserves the right to evaluate/audit supplier facility on site.

## 14. Supplier's Liability

In addition to the Supplier's obligations under this Supplier Quality Manual, the Supplier is liable according to the terms and conditions of the supply agreement entered between Danfoss and Supplier. For the avoidance of doubt, it is outlined that the agreed performance targets are solely a target regarding Supplier's general product quality level. Supplier remains liable for all cost of poor quality relating to non-conformities according to the supply agreement.

## 15. Definitions, Abbreviations and Links

### Assessment

A systematic evaluation process of collecting and analyzing data to determine the current, historical or projected compliance of an organization to a standard.

### Audit

The on-site, or virtual, verification activity, such as inspection or examination, of a process or quality system to ensure compliance to requirements. An audit can apply to an entire organization or might be specific to a function, process or production step.

### 8D

A problem-solving process developed by Ford Motor Company. The name 8D originates from the fact there are eight disciplines associated with this problem-solving format. Danfoss has adopted the 8D format to be used for both internal and external problem-solving activities.

**Capability**

The maximum amount of variation inherent in a manufacturing process. Improving process capability involves taking steps to limit the amount of variation to defined acceptable limits and thus bring the process into control.

**Capability Index**

The comparison of available tolerance to the portion of the tolerance consumed by a process in a state of statistical control.

**Cpk**

The capability index, which accounts for process capability centering, and is defined as the minimum of Cp Upper or Cp Lower. It relates the scaled distance between the process mean and the closest specification limit to half the process spread.

**Control Plan (CP)**

A strategy for controlling Products and Product processes to ensure that all process outputs remain in a state of control. A Control Plan is used and maintained throughout the Product life cycle and is responsive to changing process conditions via written descriptions of the actions that are required at each phase of the process from receiving through shipping.

**Control Shipping Levels (CSL 1 & CSL 2)**

Control Shipping Level 1 (CSL1), is a demand to Supplier in order to have them put in place a redundant inspection process (at their site) to sort for potential non-conformities to prevent their shipment to Danfoss. This inspection is in addition to normal controls, is enacted by Supplier's employees, and must be in addition to normal production process controls, through which Supplier's internal defective/ defect rate will be monitored by Danfoss.

Control Shipping Level 2 (CSL2), is a further demand above CSL1 requirements where a redundant inspection process is put into place by the Supplier using a Danfoss-designated 3<sup>rd</sup> party or Danfoss (at the Supplier's expense).

**Early Production Containment (EPC)**

A demand to Supplier in order to put in place a redundant inspection process to prevent potential non-conformances during the start-up of production after PPAP approval.

**Failure Mode and Effects Analysis (FMEA)**

A preventive analytical technique to methodically study the cause and effects of potential failures in a Product or process. The Product or process is examined for all the ways in which a failure can occur. For each potential failure, an assessment is made of its effect on the system and its seriousness, and then a review is made of the action being taken (or planned) to minimize the probability of failure or to minimize the effects of the failure.

**Gage Repeatability and Reproducibility (Gage R&R)**

The evaluation of gauging an instrument's accuracy by determining whether the measurements taken with it are repeatable and reproducible.

**Layout Inspection**

The complete measurement of all dimensions shown on a design record.

**Non-conformance or Nonconformity**

A Product or Service that does not meet requirements found in Danfoss contracts, drawings, specifications, processes, policies or with any other legal, statutory, regulatory or Danfoss requirements.

**On-Time Delivery**

The number of purchase order line items delivered on time to the required date and quantity divided by the number of total purchase order line items required.

**Ppk**

The performance index, which accounts for process performance centering, and is defined as the minimum of Pp Upper or Pp Lower.

**Parts Per Million (PPM)**

The rating gives evidence of product quality and rates quantity of nonconforming parts found by incoming inspection, and/or on the Danfoss production lines and/or customer locations.



$$\text{PPM} = \frac{\text{Complaint Quantity}}{\text{Quantity received}} \times 1,000,000 = \frac{\text{Quantity of Parts Returned, Scrapped after Rework, Wrong Labels}}{\text{Quantity received}} \times 1,000,000$$

### Occurrence Per Million (OPM)

The rating gives evidence of product quality and rates number of claims issued by Danfoss based on definitions of Claims

$$\text{OPM} = \frac{\text{Number of Claims}}{\text{Quantity received}} \times 1,000,000$$

Note: claims related to part quality and waivers.

### Process Capability

The range over which the natural variation of a process occurs as determined by the system of common causes.

### Products

Any finished or semi-finished goods, parts, components, materials and / or services manufactured for delivery to Danfoss.

### Product Submission Warrant (PSW)

The Product Submission Warrant contains Supplier, Product information, required documentation, the Supplier application warrant, and Danfoss disposition. A submission approval by Danfoss authorizes Supplier to start production.

### Production Part Approval Process (PPAP) Order

A document intended to clearly identify requirements and eliminate ambiguity between Danfoss and the Supplier, prior to production of new or changed parts. It identifies to the Supplier, part information, Special Characteristics, qualification requirements, Danfoss authorization and Supplier sign off.

### PPAP Approval Documentation Requirements

#	Requirements	Level 1	Level 2	Level 3	Level 4	Level 5
1	Design record	R	S	S	*	R
	For Danfoss proprietary components/details	R	R	R	*	R
	For Danfoss other components/details	R	S	S	*	R
2	Engineering change documents, if any	R	S	S	*	R
3	Engineering approval from Dan foss (required)	R	R	S	*	R
4	Design FMEA	R	R	S	*	R
5	Process flow diagrams	R	R	S	*	R
6	Process FMEA	R	R	S	*	R
7	Control plan	R	R	S	*	R
8	Measurement system analysis (MSA)	R	R	S	*	R
9	Dimensional results	R	S	S	*	R
10	Material, Performance reliability test results	R	S	S	*	R
11	Process capability studies	R	R	S	*	R
12	Qualified laboratory documentation	R	S	S	*	R
13	Appearance approval report (AAR)	S	S	S	*	R
14	Sample products	R	S	S	*	R
15	Master sample	R	R	R	*	R
16	Checking aids	R	R	R	*	R
17	Records of compliance	R	R	S	*	R
	Danfoss negative list conformity (incl. ROHS and REACH requirements)	R	R	S	*	R
	Specific requirements of European Communities Directives, product safety approvals (e.g. UL) and other local legal requirements if applicable	R	R	S	*	R
18	Part submission warrant	S	S	S	S	R

S = Shall be submitted to Danfoss and retain a copy of records or documentation items at an appropriate location.

R = Shall be retained by the Supplier at an appropriate location, and made available to Danfoss upon request.

\* = Shall be retained by the Supplier at an appropriate location, and submitted to Danfoss upon request.

Note: level 5 means full documentation and review on the Supplier site by Danfoss representative.

## Special Characteristics

A characteristic that can infringe on safety or regulatory compliance or customer satisfaction, or a characteristic that can cause rework or scrap AND at the same time is sensitive to variation that is difficult to control within the process.

## IATF 16949

It is a technical specification which includes systematic tools for product development and manufacturing. IATF 16949 has expanded requirements as compared to ISO 9001.

# 16. Reference Materials

The following IATF 16949 publications are available from the Automotive Industry Action Group (AIAG).

These may be ordered on-line at: <http://www.aiag.org>. Danfoss has decided to work according to these manuals, which is also expected from supplier side (ref 17 templates)

- AIAG/reference manual APQP "Advanced Product Quality Planning and Control Plan"
- AIAG/reference manual MSA "Measurement Systems Analysis"
- AIAG/reference manual SPC "Statistical Process Control"
- AIAG & VDA FMEA Handbook
- AIAG/reference manual PPAP "Production Part Approval Process"

# 17. Templates

The following are the forms referenced in this manual. To obtain blank forms, or for assistance in completing forms, Suppliers should access the following link :

<https://www.danfoss.com/en/about-danfoss/company/procurement/supplier-requirements/>.

1. Parts Warrant (PSW)
2. Production Part Approval – Dimensional Test Results
3. Production Part Approval – Material Test Results
4. Production Part Approval – Performance Test Results

5. Appearance Approval Report (AAR)
6. Control Plan
7. PPAP Requirements
8. Supplier Change Request Form (SCR)
9. Waiver Form

Note: If agreed with Danfoss, the Supplier may use its own internal documents / forms, as long as they contain all required information.

# 18. Changes in relation to previous issue

Issue	Change	Approved date/ name
Released 9.2	Approved	Nov. 1st 2012 / Danfoss Supply Chain Board
Released 9.3	Updated version	Jan. 31st 2014 / Danfoss TS Board
Released 9.4	Updated version	Jun. 2016 / DP-Q Committee and DP-MT
Released 9.5	Updated version	Aug. 2018 / Supplier Q Committee & DP-LT

Issue	Chapter/ Clause	Changes	Approval date/name
<b>Released 9.6</b>		<b>Updated version</b>	<b>Jan 2021 / Supplier Quality Committee and DP-LT</b>
	1, 3.3, 4.3, 4.4, 5.14, 6.2, 7.2, 8.2, 10.2, 11	Newly added or fully modified clauses	
	4.1, 5.5, 5.6, 5.9, 7.1, 7.2.1	Some words/sentences deleted	
	5.13, 5.15	Deleted from SQM	
	1.	Introduction speech from Ralf Havermann added	
	2.	Requirement of Branded and Traded products added	
	3.	Subtier supplier requirement and personnel competence requirement added	
	3.1	Sentence rephrased	
	3.2	QIP requirement added	
	5.	SPR/run@rate requirement added; PPAP Waiver situation emphasized; DNL requirement added; business discontinuity requirement added; Business discontinuation requirement added	
	5.5	CC/KC definition added and flow modified	
	5.12	IMDS requirement added	
	5.13	Former 5.14, EPC duration description added	

Issue	Chapter/Clause	Changes	Approval date/name
	6.	Corrective action requirement added	
	6.1	Supplier compensation detail added	
	6.5	Starting point of 20 working days added	
	7.1	OPM and CoPQ, scorecard description and escalation model added;	
	8.1	Broader definition of change impact.	
	9.	Added requirements of special marking/ identification of products related to PPAP, waiver, or deliveries other than normal production; Traceability requirement of products containing CC/KC added; FIFO requirement added	
	10.	Title modified	
	12.	Words deleted and added	
	13.	Risk evaluation requirement added	
	15.	PPM and OPM definition modified	
	16.	FMEA reference modified	
	17.	Extended name and waiver form added	
	End.		