SUPPLIER QUALITY MANUAL

OVERVIEW

Suppliers are expected to conduct business with a high degree of integrity and in a socially and environmentally responsible manner.

This Supplier Quality manual establishes quality expectations and quality requirements for suppliers of production material or services to Watts or its subsidiaries or divisions. Production material includes products and components that are incorporated into a Watts assembly or product, or finished goods, whether or not private-labeled with a Watts brand.

Table of Contents

1. SUPPLIER QUALITY POLICY

It is the policy of Watts to be our customer's first choice to provide innovative products to control the efficiency, safety, and quality of water within residential, commercial, and institutional applications. Our suppliers are a key part of our efforts to provide solutions to our customers around the world by continuously improving the overall quality, reliability, and total cost of products, components and services supplied to Watts.

2. PURPOSE

This manual is intended to communicate Watts' general philosophy regarding quality and our initial and on-going requirements for supplier quality systems and performance that will allow Watts to maintain its world-wide leadership position in providing innovative products to control the efficiency, safety, and quality of water within residential, commercial, and institutional applications for industries.

3. SCOPE

This Supplier Quality Manual applies to all suppliers that provide production material or services to Watts. Production material includes products and components that are incorporated into a Watts assembly or product, or finished goods, whether or not private-labeled with a Watts brand.

Individual Watts plants may have additional plant specific requirements, and will establish specific processes for carrying out these requirements. If a conflict exists between the requirements, the more stringent requirements will apply.

4. QUALITY PHILOSOPHY

Watts Water Technologies, Inc., including its subsidiaries, divisions, and affiliates, has been the world's leading manufacturer of innovative products to control the efficiency, safety, and quality of water within residential, commercial, and institutional applications since Watts started operations in 1874. A critical component of our leadership is the world-class quality and reliability of the products and services that we provide to our customers. Suppliers to Watts play an integral role in helping us achieve and maintain our world-class quality and reliability.

The issues surrounding the development and manufacture of any product in today's market require that Watts' suppliers maintain an effective *documented quality system* which communicates, identifies, coordinates, and controls all key activities necessary to produce a quality product.

The system must be based on the philosophy of continuous improvement, *emphasizing defect prevention and the reduction of variation and waste in the supply chain.*

In order to meet our customers' rising expectations in terms of quality, reliability and cost, the processes our suppliers use in the manufacture of their products must allow our suppliers to consistently satisfy required tolerances and specifications. Achieving conformance to our requirements through inspection, sorting, scrap, and rework is neither cost effective nor does it result in optimum quality levels. Machines and processes that can be controlled through the use of *statistical methods or mistake proofing methods* are crucial to achieving our goals for lowest cost, highest quality, and best delivery.

Continuous improvement in both products and processes is critical if Watts is to maintain world-wide leadership in the water quality marketplace. All suppliers to Watts are expected to continuously strive for improvements in the products they supply.

5. EXPECTATIONS

The foundation for any positive supplier-customer relationship starts with clear communication and an understanding of customer expectations. Watts defines these quality-related expectations for its suppliers below.

5.1 Purchased Products and Services Shall Comply with Established Specifications and Requirements:

- Engineering specifications and / or reliability requirements that apply to the commodity or specific part.
- Material specifications that apply to the product or service.
- Drawings that apply to the specific product or service.
- Industry standards not explicitly called out in specifications.
- Situations requiring review or intervention shall follow the documented Production Part Approval Process (PPAP).
- Approval of changes and deviations.
- Coordination of changes through purchasing.
- Product and services must meet 100% of all requirements.

5.2 Suppliers are Required to:

1. Explicitly review and know all requirements related to the product or service provided.

2. Follow prescribed procedures.

3. Contact Watts when requirements are misunderstood or unclear regarding the use of their product within the Watts system.

4. In all cases, acquire written approval prior to implementing any changes that may impact form, fit, function, interchangeability or reliability. This shall include manufacturing processes, quality standards for acceptance, and testing requirements.

5. Have a change control system that reacts to changes in a timely and accurate fashion.

6. Have a quality system in place that addresses design, drawing control, qualification, and pre-production activities, as well as on-going production.

7. Maintain process, product and service documentation.

8. Deploy to their supply chain, expectations and controls similar to those presented in this document to ensure the integrity of the overall product supplied including maintenance of adequate controls over their suppliers of raw material and components.

9. Generate and implement specific improvement plans following Watts audits or visits, when applicable.

10. Assist in problem resolution related to the supplier's products and services including but not limited to:

    - Providing advice in the proper use of the product or service.
    - Investigating problems that involve interaction with other components, not just known supplier defects.

11. Have the expertise and resources to perform effective root cause analysis and to take corrective and preventive action.

12. Provide notification of any and all situations that may negatively impact the supplied products quality, reliability, and safety; design and/ or production; or any other matter described in this manual.

13. Be accountable for the impact of poor quality on Watts and its customers.

14. Have a Production Part Approval Process which includes root cause and corrective action elements.

5.3 Suppliers Must Be Able To Demonstrate Compliance With:

1. Design, performance and reliability requirements.

2. Process control and capability requirements.

3. All documented requirements

Communications

In general the following contact points should be used:

- **Primary Contact** – The Watts buyer is the primary contact for all matters regarding Watts purchasing.
- **Product/Part Quality** – For issues regarding the Production Part Approval Process (PPAP) contact the person listed on the PPAP document.

6. PROPER RELATIONSHIPS WITH SUPPLIERS

Watts Code of Ethics
Watts holds its employees to a code of conduct with very specific obligations.

Watts also has very restrictive policies governing receipt of business gifts by its employees.

We ask that our suppliers be cognizant of these policies, and refrain from putting Watts employees in situations that may lead to violation of this policy. The company's Code of Business Conduct is available in the "investor relations" section of our website at http://www.watterwater.com.

7. PRINCIPLES OF SUPPLIER CONDUCT

OVERVIEW
Watts Water Technologies' commitment to integrity extends to its diverse and worldwide supply base. To ensure that suppliers conduct business with a high degree of integrity and in a responsible manner, all of Watts' suppliers are expected to conduct their business in a manner consistent with these Principles. Suppliers are also expected to be familiar with the business practices of their suppliers and sub-contractors and ensure they operate within the Principles outlined herein. Failure to abide by these principles may result in discontinuance of business relationships with Watts. Particular supplier contracts may contain more specific provisions addressing some or all of these issues.

KEY REQUIREMENTS

Business and Financial Records
Both the supplier and Watts must keep accurate records of all matters related to the supplier's business with Watts. This includes the proper and accurate recording of all expenses, payments, and time keeping records, and is particularly critical when a supplier is performing services or supplying goods to Watts relating to business or interactions with governments. Errors or omissions should be promptly brought to the attention of Watts for reconciliation.

Improper Payments
Bribery and kickbacks are illegal and subject to criminal penalties in many countries, including the United States. Bribes, kickbacks and similar payments to government officials, Watts employees or agents acting on Watts' behalf are strictly prohibited. This prohibition also applies in areas where such activity may not violate local law, and Suppliers should work against corruption in all its forms, including extortion and bribery of any form

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Child and Forced Labor
Watts will not engage in or support the use of child labor. Suppliers are expected to comply with applicable local child labor laws and employ only workers who meet the applicable minimum legal age requirement for their location. In the absence of local law, suppliers shall not employ children under the age of 15. Watts also does not engage in or support the use of forced or involuntary labor, and will not purchase material or services from a supplier utilizing forced or involuntary labor. All Suppliers should ensure their practices do not encourage the use of forced, compulsory, or child labor.

KEY EXPECTATIONS

Environment, Health & Safety
Watts respects the environment and the health and safety of its employees and conducts its operations in compliance with applicable laws and regulations. Suppliers are expected to conduct their operations in a way that protects the environment and supports accident prevention and minimizes exposure to health risks, and to comply with all applicable environmental, health and safety laws and regulations in the countries in which they operate. Suppliers should support a precautionary approach to environmental challenges, undertake initiatives to promote greater environmental responsibility, and encourage the development and use of environmentally friendly technologies.

Work Conditions, Compensation
Watts pays employees a competitive wage. Suppliers are expected to comply with all applicable wage and hour labor laws and regulations governing employee compensation and working hours. Watts supports diversity and equal opportunity in employment. Unlawful discrimination in the workplace is not tolerated. Suppliers are expected to comply with all applicable local laws concerning discrimination in hiring and employment practices, and to provide a safe work environment for their employees, while encouraging the elimination of discrimination in respect of employment and occupation throughout the supply chain. Suppliers should also support and respect the protection of international human rights within their sphere of influence and make sure they are not complicit in human rights abuses.

Conflicts of Interest
Employees of Watts should act in the best interest of the Company, and therefore should have no relationship, financial or otherwise, with any supplier that might conflict, or appear to conflict, with the employee's obligation to act in the best interest of Watts. Friendships outside of the course of business are inevitable and acceptable, but suppliers should take care that any personal relationship is not used to influence the Watts employee's business judgment. If a supplier employee is a family relation (spouse, parent, sibling, grandparent, child, grandchild, mother- or father-in-law, or same or opposite sex domestic partner) to an employee of Watts, or if a supplier has any other relationship with an employee of Watts that might represent a conflict of interest, the supplier should disclose this fact to Watts or ensure that the supplier employee does so.

Gifts, Meals and Entertainment
Employees of Watts are discouraged from accepting anything more than modest or nominal gifts, meals and entertainment from suppliers. Ordinary business meals and small tokens of appreciation such as gift baskets at holiday time generally are fine, but suppliers should avoid offering Watts employees travel, extravagant entertainment, frequent meals or expensive gifts. Gifts of cash or cash equivalents, such as gift cards, are never allowed.

Confidential Information
Watts is dedicated to complying with applicable laws concerning proprietary, confidential and personal information. Suppliers are expected to comply with all applicable laws and regulations governing the protection, use and disclosure of Watts proprietary, confidential and personal information, and to respect the proprietary, confidential and personal information of its customers where such information is provided to the supplier.

CONTACT US
For inquiries relating to the Principles of Supplier Conduct, please contact your Supply Management representative at Watt.

Questions or Concerns may also be raised using one of the following confidential options:

By email: ethics@watts.com

By calling toll-free: 1-877-792-8878

By Mail:
Legal Department
Watts Water Technologies, Inc.
815 Chestnut Street
North Andover, MA 01845
USA
By Fax: 1-978-688-2976

8. SUPPLIER SELECTION

Ability, capacity, integrity, financial status, geographic location, performance, reliability, quality of product, delivery and overall customer-supplier relation are all factors considered by Watts when evaluating potential suppliers prior to soliciting quotations and during the term of our supplier arrangements.

Watts must be assured that new suppliers will be able to deliver consistently cost or other competitive advantages.

9. SUPPLIER QUALITY APPROVAL PROCESS

This section identifies and explains the general qualification requirements for suppliers to Watts by covering all aspects of the production cycle. Each supplier location providing parts to Watts shall have a quality system structure that meets Watts' requirements in order to ensure a sustainable supply chain exists. Specific manufacturing processes and / or individual parts may be qualified in order to ensure that parts are made properly.

The approval process covers three areas:

1. Supplier Qualification ensures that the supplier has basic systems in place to produce parts of consistent quality, be capable of reducing cost over time and can perform the various ancillary duties of a supplier such as corrective action.

2. Part Qualification ensures that the part is capable of meeting our technical / performance needs.

3. Production Qualification ensures that the specific manufacturing process in place will produce a part of consistent quality.

Circumstances surrounding the procurement of a given part will be used by Watts to determine what specific requirements are applicable.

The circumstances include, but are not limited to:

- New part or design.
- New supplier.
- New plant or manufacturing location of an existing supplier.
- Changes in form, fit, or function.

The Production Part Approval Process (PPAP) is used by Watts to define and communicate

specific qualification requirements that a supplier must meet for a given part.

- The PPAP will be prepared by the supplier or Watts and provided early in the sourcing process.
- Suppliers shall review the PPAP to ensure that all specific requirements are understood, then sign and return the completed PPAP to Watts.
- The supplier can initiate / responds via the Production Part Approval Process (PPAP).

Use of the PPAP will:

- Help facilitate communication between the supplier and Watts.
- Ensure the supplier understands Watts specific quality requirements.
- Ensure the supplier possesses the necessary information to develop accurate quotations.

9. SUPPLIER QUALIFICATION REQUIREMENTS

9.1 Quality System

All suppliers shall maintain an effective documented quality system that communicates, identifies, coordinates, and controls all key activities necessary to produce a quality product.

When specified, suppliers shall be certified / registered to one of the following International Quality Management standards by a recognized independent, certified 3rd party registrar. Suppliers may be required to submit a copy of their Quality manual and / or certificate to Watts as objective evidence of quality system certification.

ISO 9001:2008	Quality Management Systems – Requirements
ISO / TS 16949	Quality Management Systems - Automotive Requirements

Watts reserves the right to:

- Verify Supplier quality systems (this may take the form of a visit or a full audit.) The standard audit utilized by Watts is the Self Audit.
- Verify a supplier's conformance to an applicable quality standard.
- Recognize acceptance of a third-party audit conducted by 3rd party registrars.
- Refuse acceptance of a third-party registration that is not from a recognized registrar.

9.2 Watts Self Audit

The Watts Self Audit assists suppliers in reaching World-class quality goals through a never-ending process of continuous improvement. It will not however, provide absolute description of what is required to assure quality in products and service, and Watts reserves the rights to supplement a self audit with a full audit.

The supplier assesses its quality system and develops improvement plans based on the results of the Self Audit to improve its overall quality reliability, and the total cost of components supplied to Watts, as well as other important customers.

The Self Audit criteria are intended to assess a supplier's quality system, process control capability, as well as assist the supplier to identify strengths, weaknesses, and / or areas requiring improvement.

9.2.1 Self-Audit Assessment

To determine the supplier's readiness for a site survey the self audit assessment is completed by suppliers independently and then evaluated by Watts. The assessment requires suppliers to address specific areas of the quality system and process control categories of the Self Audit. The criteria generally follow ISO 9001:2008 adding specific requirements to ensure effective process control.

9.2.2 Self Audit Survey

This survey consists of various quality system and process control categories and is intended to provide a fair appraisal of the supplier's quality system, process controls, and commitment to quality at the time of the survey. From time to time Watts will revise this survey to incorporate new quality system requirements.
A Watts survey team performs an on-site evaluation of suppliers and from available evidence and observations, assesses the supplier's compliance at one of four levels for each of the items.

Reference: Watts Self Audit.

10. PRODUCTION PART APPROVAL REQUIREMENTS

The Production Part Approval Process (PPAP) is used to determine if the supplier properly understands all Watts requirements and provides for physical testing and qualification to ensure that, as designed and as made, the parts meet requirements.

The PPAP is a tool used to document all parts qualification requirements relevant to a specific part or part family. The requirements for PPAP must be met using parts produced by the actual production processes. In order to both standardize and simplify requirements, the Automotive Industry Action Group (AIAG) manuals listed as references support this requirement. Please contact your Watts representative if you are unable to obtain these references.

Production Part Approval Process

1. Watts will provide form WW-PPAP-109 for each part and/or family of parts, to be produced.
2. The supplier shall:

    a. Review the PPAP report. Questions / disagreements should be addressed prior to acceptance. Sign the PPAP. Signing indicates agreement with requirements.

    b. Return the PPAP report to Watts, within 10 business days.

    c. Contact Watts as requirements are completed and / or to address any difficulties in successfully meeting the requirements immediately.

Production Part Approval Process (PPAP) Warrant Submission

PPAP compliance is demonstrated by submission of the PPAP Warrant package and should be made as far in advance of the production start- up as possible, but at least 45 days prior to production.

1. The PPAP submission package should be transmitted using the PPAP Warrant.

2. The supplier must sign the warrant.

3. Watts will review the PPAP submission and provide disposition to the supplier in a timely manner.

- When the submission is approved, Watts will sign the PPAP Warrant and return it to the supplier, which authorizes the supplier to start production.

- If the submission is not approved Watts will contact the supplier with the reasons for disapproval. The supplier must respond

appropriately, and is not authorized to start production until the PPAP Warrant is resubmitted and approved.

In order to meet end product ship dates, allow sufficient time for requests for revisions or corrections when establishing dates for sample submissions. Any requirements not satisfied should be addressed prior to PPAP submission and noted in the PPAP Warrant.

At Watts discretion, any or all of the PPAP items may be reviewed on-site at the supplier's facility as part of the process qualification audit. The following sections provided detail on each of the PPAP requirements.

References: Production Part Approval Process (PPAP) form.

11.1 PPAP Check Sheet

The report will be prepared by Watts and provided early in the procurement process. It will define submission requirements and may include additional requirements including the following:

- Process Flow Diagram.
- Design / Process Failure Mode and Effects Analysis (DFMEA / PFMEA).
- Control Plan (CP)
- Process capability studies.
- Gage Repeatability and Reproducibility (R&R) Studies.
- Dimensional Analysis.
- Material performance and reliability test results.
- Sample Parts.
- Other requirements as specified.

A requirements review will be conducted with the supplier to review the PPAP requirements. This joint review includes an examination of drawings and specifications, applicable industry standards, key product or process characteristics, inspection and test requirements, material specifications and certifications, application conditions, packaging requirements, etc.

References: Production Part Approval Process; AIAG Manual.

11.2 PRODUCTION PART APPROVAL PROCESS (PPAP) WARRANT

The PPAP Warrant shall be prepared by the Supplier and submitted to Watts.

Note: The PPAP Warrant may include additional documents detailing exceptions or further explanations.

PPAP Warrant Validity

Unless otherwise specified on the PPAP Warrant, an approved PPAP Warrant is valid for the life of the contract or until revoked by Watts. Should one of the following conditions occur, the supplier must notify Watts prior to first production shipment:

- Correction of a discrepancy on a previously shipped part.
- Product modified by an engineering change to design records, specifications, or material on an approved Drawing Change Request (DCR).
- Use of another optional process of material than was used in a previously approved part.
- Production from new or modified tools (except perishable tools), dies, molds, patterns, including additional or replacement tooling.

- Production following refurbishment or rearrangement of existing tooling or equipment.

- Production following any change in process or method of manufacture to include changes in lubricants, mold release agents, or other process solutions.

- Production from tooling and equipment transferred to a different plant location or from an additional plant location.

- Change of source of key subcontracted parts, materials or services (for example, heat treating, plating).

- Product re-released after the tooling has been inactive for volume production for twelve (12) months or more.

- Following a customer request to suspend shipment due to a supplier quality concern.

- Any other activity that will result in a change to the Control Plan (CP).

The supplier will utilize a Supplier Deviation Request (SDR), to notify Watts should any of these events occur. The SDR will be reviewed by Watts and a full or partial PPAP resubmission may be required. Should resubmission be required, a new PPAP will be issued to the supplier. Full approval, in writing must be gained prior to first production shipment.

References: Production Part Approval Process (PPAP), Warrant, First Article, Supplier Deviation Request (SDR); AIAG manual on APQA.

11.3 Key Components

Key components require a higher degree of rigor than standard components. Additional requirements will be specified on the PPAP.

11.4 Key Characteristics (KCs)

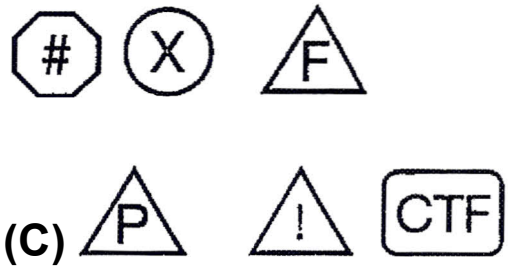
A key characteristic is any feature of a material, process, part, assembly, or test whose variation within or outside the specified requirements has a significant influence on product fit, form, function or other expected deliverable. Key characteristics shall be certified via Process Certification or other similar, approved methodologies as defined in Appendix 1- Process Certification.

Watts will define the key characteristics for which the supplier needs to certify and document these on the PPAP. Determination of these key characteristics may occur through various methods, including:

- Notations and / or symbols documented on Watts engineering drawings and specifications.

- Communication of known process issues, production problems, or field problems.

The various symbols used on Watts document to signify key characteristics are examples show below:



The supplier may identify additional key characteristics beyond those defined by Watts.

This is required for suppliers with design responsibility. Any additional supplier-identified key characteristics will be documented on the PPAP and must meet the process certification requirements or other similar, approved methodologies as defined in Appendix 1- Process Certification. Watts may further supplement these key characteristics from time to time.

11.5 Process Audit

When specified, Watts may require a process qualification audit at the supplier's manufacturing facility. This audit focuses on the specific process quality controls that the supplier has in place for the products being manufactured for Watts, as well as part / commodity specific process requirements.

12. SPECIFIC REQUIREMENTS

12.1 Failure Mode and Effects Analysis (FMEA)

The Failure Mode and Effects Analysis (FMEA) is 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 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. The FMEA is a living document and shall be revised as changes are made to the product or process.

When specified on the PPAP, suppliers are required to develop a Design (product) FMEA and / or a Process FMEA and submit to Watts. Suppliers may be invited to participate in the preparation of 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 as approved by Watts.

Reference: AIAG Manual on Potential Failure Mode and Effects Analysis (FMEA)

12.2 Control Plan (CP)

The Control Plan is a detailed, step-by-step listing by which the part, comment, etc., is to be manufactured, inspected and tested. In effect, the plan describes the actions that are required at each phase of the process including receiving, in-process, out-going, and periodic requirements to assure that all process outputs will be in a state of control. During regular production runs, the CP provides the process monitoring and control methods that will be used to control characteristics. The CP is to be maintained and used throughout the product life cycle. Early in the product life cycle its primary purpose is to document and communicate the initial plan for process control. Subsequently, it guides manufacturing how to control the process and ensure product quality. The CP is a living document, reflecting the current methods of controlling the process, and shall be updated as control methods are evaluated and improved.

Suppliers are required to develop a CP and submit to Watts for approval. The CP is identified by part number/ part family and revision level and shall include as a minimum the following:

- Part number, part name, drawing and revision.
- Sequence of manufacturing operations, listing the following for each step:

- Process name / Operation Description.
- Applicable equipment, tools, fixtures, etc.
- Description of features or characteristics that are to be tested / inspected.
- Specification or tolerance.
- Method of inspection.
- Frequency of checks.
- Control method.
- Reaction plan in the event of nonconformance/out-of-control condition.

A single CP may apply to a group or family of products that are produced by the same processes at the same location and shall:

- Identify all key characteristics.
- Identify sub-contractors and services provided
- Identification, marking, packaging and preservation requirements.

The supplier shall:

- Monitor actual processing of the part.
- Compare processing to the CP in all aspects.
- Report to Watts any variance/deviations from the plan.

Watts reserves the right to audit the supplier's facility and practices to the CP as well as audit or observe the processes of sub-tier suppliers. This Audit may be part of a certification assessment or separate. Such audit shall not relieve the supplier's responsibility to produce defect-free parts.

The PPAP contains a CP form. This form can be used or supplier may utilize their own format, as long as the document contains all of the required information as detailed above.

References: Control Plan (CP), ALAG Manual on Advanced Production Quality Planning(APQP)

12.3 Short Term (Preliminary) Process Studies

An acceptable level of process capability or performance must be determined prior to production for all key characteristics. The purpose of this requirement is to determine if the production process is likely to produce product that meets requirements.

Initial process studies, often referred to as short-term or preliminary studies, refer to assessments of the manufacturing process based on data collected over a short period of time, usually less than 30 days or from one operating run. The collection of this data should consider sampling technique and be analyzed with control charts. Based on the capability study analysis and method for sampling a minimum value of either a 1.33 Cpk or 1.67 Ppk is required as applicable. Exceptions must be authorized by Watts in writing.

The initial process studies shall be available prior to the first production of new parts. If acceptable process capability / performance cannot be obtained prior to first production, a corrective action plan and revised Control Plan must be developed by the supplier and approved by Watts. This short-term capability requirement may be replaced by long-term capability results from the same or similar processes, with Watts concurrence.

Where a product or feature does not lend itself to discrete measurements (Attributes – for example, printed circuit boards tested as "Go / No Go") the supplier shall propose, for Watts approval, a method of evaluating process capability.

Initial process studies shall be performed using the following references.

References AIAG Manual on MSA; AIAG Manual of SPC.

12.4 Long-Term Process Capability

Long-term process capability studies consist of data collected over a longer period of time or multiple production runs. The studies reflect all possible types of normal; variation found in the manufacturing process, such as material, method, personnel, fixtures equipment, tool wear, and environment.

The period of time should be long enough to include all expected sources of variation. Process capability is defined when the control charts for this interval show the process to be in statistical control.

For key characteristics, Watts requires a minimum of 1.33 Cpk.

If the criteria above are not met, suppliers shall implement:

- 100% inspection until required capability is demonstrated.
- Mistake proofing devices to screen out nonconforming products.
- Process improvement actions.

Note: Since 100% inspection is not cost effective and is often ineffective at screening out nonconforming products, it should be considered an emergency measure, rather than a permanent feature of the process. The overriding quality focus should be on prevention, not detection.

References: AIAG Manual on MSA; AIAG Manual on SPC.

12.5 Measurement Systems Analysis (MSA) and Gage Repeatability and Reproducibility (GR&R)

Gage Repeatability and Reproducibility (GR&R) studies measure the total repeatability and reproducibility of a gage system as a percentage of the total specification.

Watts requires gage repeatability and reproducibility analysis for all variable gages that are used to monitor key product or process characteristics. Watts recommends that gage R&R studies be performed at least with each measuring instrument calibration and whenever production personnel using the measuring instrument are changed.

The preferred method for performing the gage R&R study on variable gages is the average and range method. The allowable variation of the repeatability and reproducibility of the gage system (gage and operator) is identified on the PPAP. If the supplier uses a gage outside the PPAP allowable maximum Watts shall be contacted for approval (generally, 20% is the max allowable).

Attribute gages that are used to monitor key product or process characteristics must also undergo gage studies. The method used will be agreed upon between the supplier and Watts.

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 is used to accept or reject parts.

Reference: AIAG Manual on Measurement System Analysis.

12.6 Sample Parts

The supplier must:

- Provide the number of sample parts as specified on the PPAP. The specific sample size will be determined based on factors such as component size, complexity, cost, projected volume, etc.
- Take or make samples from actual production tooling and / or processes unless otherwise approved in writing. Where multiple production molds, cavities, dies, machines, etc., are utilized, samples are required from each.
- Complete the First Article Inspection Report (FAIR) as required, and provide with the sample parts. The ISIR is a comprehensive inspection report of the part being qualified. It is considered a full part layout and must accompany all samples submitted. It includes measurement and verification of all dimensions, drawing notes, engineering specifications and quality standards. This is sometimes referred to as a First Article Inspection (FAI) or First Article Inspection Report (FAIR).

Note: Determination for an ISIR as part of the PPAP process is made by Watts and will be specified on the PPAP.

For actual recording of inspection results, a checked print where the results are legibly written on a part drawing may also be utilized. Actual variable data must be provided in terms of measurements, not attribute (pass / fail; go / no go; etc.) data. All results must be traceable to the specific samples from which obtained.

Reference: Production Part Approval Process, (PPAP) First Article Inspection Report (FAIR)

12.7 Dimensional Analysis

Watts may require additional dimensional analysis beyond the quality of sample parts submitted in accordance with the requirements of paragraph 12.6. In these cases, details will be specified on the PPAP as part of the PPAP process.

It is preferred that data be submitted electronically via the Watts Quality Management System Software (WQMSS). Actual variable data must be provided in terms of measurements, not attribute (pass / fail; go / no go; etc.) data.

12.8 Material, Performance, and Reliability Test Results.

The supplier, or a qualified independent third party, must supply specific material, performance and or durability test results. Actual results must be compared with agreed upon specifications. For certain critical parts Watts may require testing by third parties.

12.9 Process Flow Diagram

The process flow diagram is a schematic representation of the current or proposed process flow and is used to analyze sources of variations of machines, materials, methods, and manpower emphasizing the impact of sources of variation on the process. The flow chart helps to analyze the total process rather than individual steps in the process.

The supplier shall have a process flow diagram that clearly describes the production process steps and sequence beginning at material receipt through packaging and shipping.

Where process steps include operations performed by outside sources, these steps need to be identified within the diagram, and 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.

12.10 Certifications, Certificates, and Code requirements

Drawings, contracts, or other specifications may require additional quality system or particular certification requirements:

- ASME
- NSF
- FM
- CSA
- UL
- NB
- ASSE
- USC
- CSTB
- AWWA
- SIET
- KIWA
- IAPMO
- Japanese Agencies
- European Agencies
- Australian Standard

It is the supplier's responsibility to ensure these requirements are fulfilled and maintained current. Evidence of compliance to these requirements must be submitted as part of the PPAP Warrant and individual shipments, if required. Supplier must notify Watts immediately if the status of one of these requirements changes.

12.11 Other Requirements

Watts may impose other requirements as necessary. These or other additional requirements will be identified early in the sourcing process and the PPAP.

13. NON-CONFORMING PRODUCT

The following sections identify and explain key quality requirements that are applicable for non-conforming product.

Under no circumstances shall a supplier ship non-conforming product without written authorization.

13.1 Warranty

Definitions of warranty obligations of suppliers are provided in agreements enforced between the supplier and Watts or the Terms and Conditions of Watts Purchase Orders.

13.2 Supplier Identified Non-conforming Product.

The supplier may find products, through their quality control processes or from reports by other customers, which were produced outside of specifications. The supplier is expected to immediately:

- Segregate these products and determine if this error may have occurred, undetected, in earlier production.

- In the following situations notify Watts utilizing the Supplier Deviation Request.

    - If the non-conformance affects form, fit or function of the part.
    - If there is likelihood that non-conforming product had "escaped" the factory.
    - If the non-conforming product will affect deliveries to Watts.
    - In all cases where a report of non-conforming product is received from a customer, where Watts is using a similar part.

The supplier is responsible for the segregation and non-shipment of the non-conforming material until a deviation is granted. Discrepant material received at Watts without an approved SDR will be rejected and returned to the supplier with all extra handling and shipping costs incurred by the supplier and the Watts Administration Fee. No discrepant material will be processed until a deviation is approved by all required personnel.

Reference: Supplier Deviation request (SDR), also paragraph 14.1.3

13.3 Watts Identified Non-conforming Product

Watts may discover non-conforming material inadvertently shipped by the supplier, prior to shipment to the customer. In other cases, non-conforming material may not be discovered until the customer is using it. The following paragraphs describe required activities when non-conforming material is discovered by Watts.

13.3.1 Non-Conformances Found Prior to Shipment to Customers

In the event supplier-responsible non-conformances are discovered by Watts prior to shipment to the customer, the parts / components in question will be identified and segregated to preclude further use.

A determination of the next steps in the process will be based on several criteria, including but not limited to, the defect's criticality, quantity, cost, and other factors.

Based on this evaluation, Watts will determine whether:

- Defects are accumulated and returned to suppliers in accordance with Watts plant procedures.

- Suppliers sorts defects at Watts Sites.
- Supplier reworks defects at Watts Sites.
- Contingent on contract specifics, Watts reworks defects and charges supplier for rework costs and Administration fees.

In addition to reimbursement for the cost of the non-conforming parts, suppliers are expected to reimburse Watts for the costs associated with processing the non-conformances. This will typically be handled through a standard charge-back determined by Watts to cover the costs.

Additionally, suppliers whose 3-month defect rate (as measured by Watts) exceeds a pre-defined rate will be placed on probation and required to submit a formal improvement plan. If improvement does not occur within the subsequent three months, third-party source inspection may be imposed at the supplier's expense. This requires product to be inspected at the supplier's location and approved prior to shipment to Watts.

13.2.2 Field Failure

The warranty obligations of suppliers for non-conforming parts discovered in the field, as well as their disposition, shall be specified in the commercial contract enforced between the supplier and Watts.

If a critical field failure issue has been identified, a determination of the next steps in the process will be made based on several criteria including the failure's criticality, quantity, cost, and other factors. Based on this evaluation Watts may require:

- Defective parts be repaired / replaced in the field by Watts.
- Defective parts be repaired / replaced in the field by supplier.
- That product be recalled, and repaired / replaced, as determined.

In all cases listed above, suppliers are expected to reimburse Watts for all costs associated with correcting field failures, and for any other costs imposed on Watts because of such failures, examples: Field Labor Claims, Field Customer Water Damage Claims.

14. RESOLUTION AND DEVIATION / CHANGE PROCESS

The resolution process for non-conforming material and processes identified by Watts or the supplier includes Supplier Corrective Action Requests (SCAR) and Supplier Deviation Requests associated with processing defective or non-conforming material. If the actual cost from a defect exceeds the standard charge, the actual cost incurred will be charged back.

14.1 Supplier Initiated Deviation / Change

14.1.1 Product Deviation / Change

In certain instances, it may be necessary for the supplier to deviate from Watts requirements and specifications. Request for such deviations shall be made via Watts SDR process and sent to the Watts Purchasing representative (Buyer).

When Changes do not affect fit, form or function, an SDR may be submitted for the following:

- Non-conforming material found at the supplier's facility.
- To request substitution of material.

For a permanent product change, Watts reserves the right to re-qualify the product and will issue an appropriate PPAP.

Reference: Supplier Corrective Action Requests (SCAR), Supplier Deviation Request (SDR), Production Part Approval Process (PPAP).

14.1.2 Process Deviation / Change

Process deviations are requested by way of the SDR.

Process deviations are required for any changes to process that are listed on Watts approval process Control Plans.

Watts expects suppliers to constantly strive to improve quality and reduce process variation through system improvements. To achieve these goals, suppliers may require process deviations, either temporary or permanent due to design changes or other unforeseen circumstances (such as changes in equipment / tooling, changes in critical sub-suppliers, etc.)

For a permanent process change, Watts reserves the right to re-qualify the product and will issue an appropriate Production Part Approval Process (PPAP).
Watts may require the supplier to maintain a safety stock of product produced under the original processes for a period while deliberate changes are proven out. This safety stock can normally be used later for production.

Reference: Production Part Approval Process (PPAP)..

14.1.3 Supplier Deviation Request (SDR)

Prior to shipping any non-conforming product or product produced by a process other than that listed on a Watts approved process CP, suppliers must submit a written SDR to their Watts Purchasing contact (Buyer) for approval.

SDR required information:

- The current process / product.
- The proposed deviations / changes.
- The reason for deviations / non-conformances with supporting data.
- State whether the changes in question is permanent or temporary. If temporary, these requests shall identify batch or time duration.
- Shall identify any risk due to the process change / non-conforming product and any mitigation activities.

Discrepant material received at Watts without an approved SDR will be rejected and returned to the supplier at the supplier's expense with all additional handling and shipping cost incurred by the supplier.

Supplier will send the SDR to Watts.

- Once approved, all material shipped to Watts must be accompanied by a copy of the approved SDR. Watts reserves the right to request a written corrective action plan via a Supplier Corrective Action Request (SCAR).
- If approval is not granted, the reason for disapproval will be summarized on the request form and returned to the supplier.

SDRs shall not be used to cover up or replace the lack of proper quality systems or controls at the supplier location. Watts views excessive use of SDRs for non-conforming material as an abuse and an indicator that a supplier may have a serious breakdown in their quality system.

Reference: Supplier Deviation Request (SDR), Supplier Corrective Action Report (SCAR).

14.2 Non-Conformance / Supplier Corrective Action Request (SCAR).

The need for a formal SCAR will be evaluated in terms of potential impact upon production cost, performance, reliability, safety, and customer satisfaction. Watts will request a supplier to submit a formal written corrective action plan to address specific non-

conformances identified at either a plant or in the field using the 8D Corrective Action Report form (Attachment). Suppliers are expected to fully comply with these requests.

The supplier's response must include root cause determination, containment action (short-term corrective action), and permanent (long-term) corrective action. As part of the corrective action, a defined implementation plan with effective dates must be included, as well as disposition of suspect material.

The information concerning the containment action (steps D1-D3 of the 8D form) shall be provided in writing to Watts within 24 hours. If Watts disagrees with the containment action, the supplier must respond (with a revised containment action) within 24 hours. Failure Analysis leading to the root cause determination shall be done with in a time period acceptable to Watts. The SCAR will not be considered complete until proposed corrective and preventive action has been approved by Watts and its effectiveness verified.
Reference: 8D Supplier Corrective Action Report (SCAR).

15. SUPPLIER PERFORMANCE METRICS

Feedback on supplier performance is a critical component for any positive supplier-customer relationship. Performance metrics provide the basis for continuous improvement efforts and is an expectation that Watts has for all suppliers. Improvement targets may be established and reviewed on a schedule set by Watts.

Watts issues monthly score cards to suppliers.

Watts reserves the right to formally assess supplier performance and take actions to protect Watts and our customers. When requested, suppliers are expected to provide formal status updates on actions being taken to address poor performance.

16. ENVIRONMENT, HEALTH & SAFETY

Environment, Health & Safety is of prime importance to Watts.

It is expected that suppliers will comply with the Watts EH&S expectations listed below:

- Provide safe working conditions for all employees, customers and contractors.
- Adhere to all applicable national, regional, state and local laws and regulations governing Environment, Health, and Safety.
- Operate in a manner that minimizes the impact to the environment.
- Limit the use of natural resources and promote sustainable natural resource practices.
- Extend and communicate these EH&S expectations to suppliers.

For additional information, contact the EH&S department in Watts.

17. DEFINITIONS AND ABBREVIATIONS

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. Watts 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 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.

Non-conforming product / service
Non-fulfillment of and intended requirement for reasonable expectation for use, including safety considerations.

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.

Production Part Approval Process (PPAP)
A document intended to clearly identify requirements and eliminated ambiguity between Watts and a supplier, prior to production. It identifies Supplier, part information, key characteristics, qualification requirements, Watts authorization and supplier sign off.

Part Qualification Process
A series of structured activities leading up to acceptance of a product.

Parts Per Million (PPM)
A measurement of the defect rate in a product, calculated as: PPM=(Total number of defective parts) x 1,000,000 / (Total number of parts received).

Production Part Approval Process (PPAP)Warrant
The warrant contains supplier, part information, required documentation, the supplier application warrant and Watts disposition. The submission approval by Watts authorizes the supplier to start production.

Process Capability
The range over which the natural variation of a process occurs as determined by the system of common causes. Process capability has three important components:

1. Design specification.
2. Centering of the natural variation.
3. Range or spread of the variation.

The importance of process capability is in assessing the relationship between the natural variation of a process and the design specifications. This relationship is often quantified by measures known as process capability indices. The most common of these are Cpk and Ppk.

Process Performance Index (Ppk)
Performance index, which, accounts for process centering defined as the minimum of USL-X bar / etc. Ppk should only be used to compare to / or with Cp and Cpk as well as measure and prioritize improvement over time.

Production Material And Services
Includes parts, components or raw material that are directly used in the manufactured of Watts products; supplier designed products that are incorporated into a Watts assembly / product; and finished goods branded by Watts.

Repeatability
Assesses the variation in a measurement system caused by:

- The combined sources of measurement variation of a gage or;
- Test equipment when used by one operator or;
- Under one set of environmental conditions.

Reproducibility
Variation in measurement averages when more than one operator or set of environmental conditions are imposed on the gage or piece of test equipment.

Supplier Deviation Request (SDR)
A form submitted by the supplier that is used to document and request approval for any product or process deviation.

Supplier Corrective Action Report
A formal request by Watts to take action to eliminate the cause(s). of an existing non-conformity or other undesirable situation in order to prevent recurrence (SCAR).

Control Plan (CP)
Reflects a strategy for controlling parts and processes to ensure all process outputs remain in a state of control. The 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.

Failure Mode and Effects analysis (FMEA)
A preventive analytical technique to methodically study the cause and effects of potential failures in a product or a 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 a review is made of the action being taken (or planned) to minimize the probability of the failure.

Gage Repeatability and Reproducibility (Gage R&R or R&R)
The evaluation of a gauging instrument's accuracy by determining whether the measurements taken with it are repeatable and reproducible.

Integrated Product Development (IDP)
The practice of utilizing teams to develop products in order to ensure that all elements of the product life cycle are addressed.

Key Characteristic
Any feature of a material, process, part, assembly, or test, whose variation within or outside the specified requirement has a significant influence on product fit, form, function or other expected deliverable, and thus should be controlled within prescribed acceptance limits via Process Certification practices.

18. REFERENCE MATERIALS

It is the responsibility of the supplier to ensure that they are working to the latest version of specifications referenced within this document as well as Purchase Order requirements.

The publications listed below provide additional information concerning quality assurance processes and techniques discussed in this manual and are available to suppliers through their Watts contacts.

- Business Gifts from Suppliers, Watts Ethics Brochure.
- The Giving and Receiving of Business Gifts, WATTS Ethics Brochure.
- Production Part Approval Process.
- WattsQR-09.1 Process Certification Requirements.
- Supplier Corrective Action Request.

It is the responsibility for the supplier to obtain copies of non-Watts documents specified within this document. The following publications are available from the Automotive Industry Acton Group (AIAG). All manuals are available in English, and many are available in other languages and may be ordered on-line at: http://www.aiag.org.

- Advanced Product Quality Planning (APQP) and Control Plan (CP)
- Measurement System Analysis.
- Potential Failure Mode and Effects Analysis (FMEA).
- Production Part Approval Process (PPAP)
- Statistical Process Control (SPC)

19. APPENDICES

- Forms can be found on the Watts Water Technologies Supplier Web site. http://www.wattswater.com/Suppliers

Revision History

Rev 6 Initial release of Supplier Quality manual to online supplier website.

Rev 7 Corrected release dates of PPAP and Supplier Deviation form in the Supplier Quality Manual on page 3 and updated hyperlink in manual. No changes were made to forms.