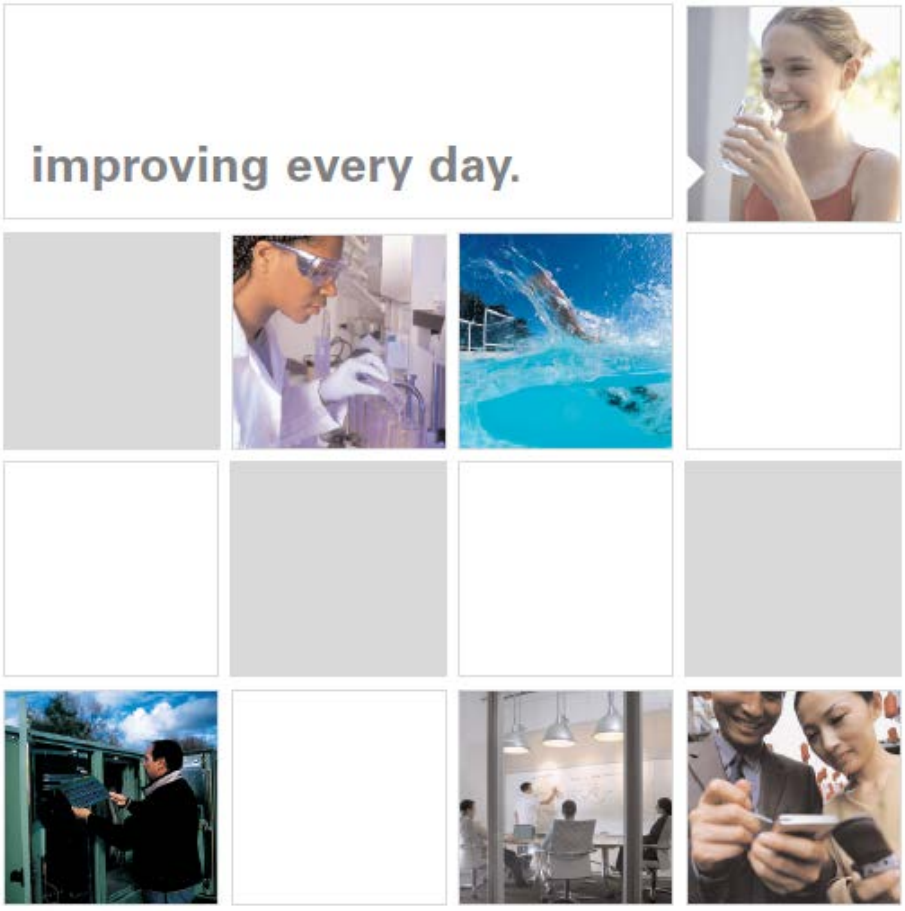
Global Supplier Guide



PENTAIR

Revision C

Printed versions of this Guide may not be current. To ensure that you have the current version, please refer to Supplier Information Website at www.Pentair.com.

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Pentair

Pentair is a global provider of industry leading products, services, and solutions that fit the world's changing needs. We aim to deliver adaptive, industry-leading solutions that help ensure a safer, healthier future for all.

Pentair invents and manufactures solutions that address some of the world's toughest challenges, with over 75 percent of our products, services and technologies related to food, water or energy. Collaborating with industrial partners, government, non-governmental organizations, and other companies, we serve a wide variety of customers in the food and beverage, residential and commercial, industrial, infrastructure, and energy verticals.

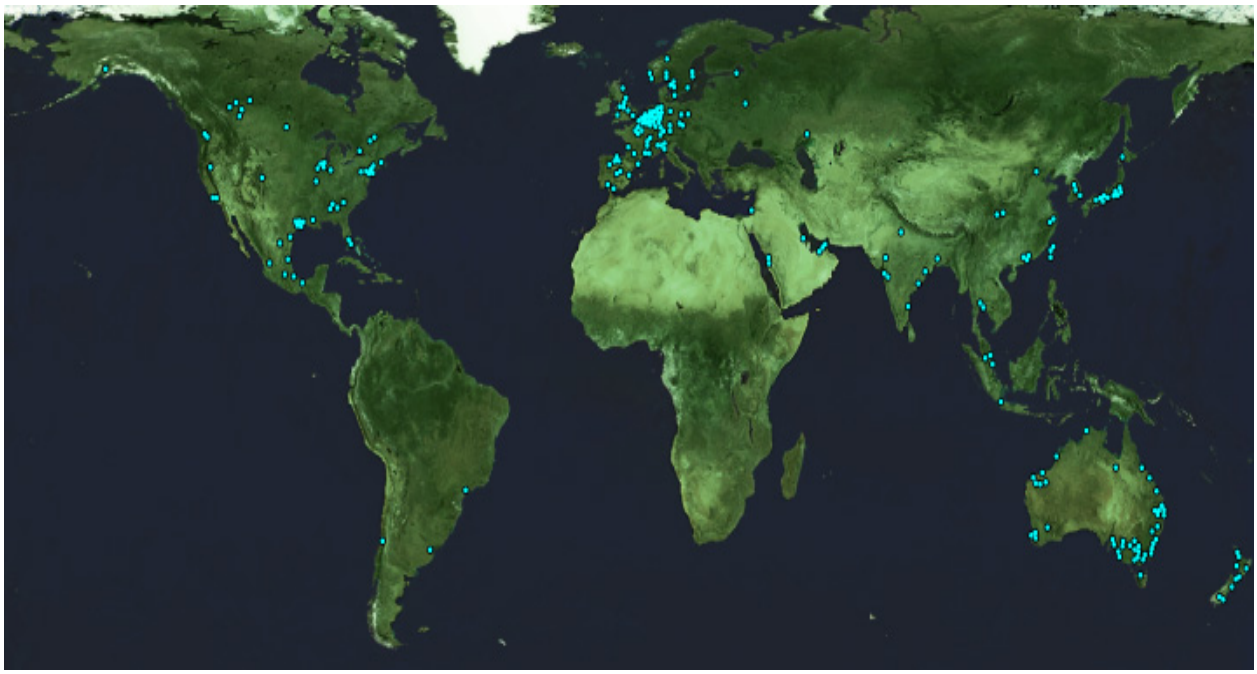
Everything we do is driven by our passion to help people live better. By acting today for the benefit of tomorrow, we ensure that clients are able to respond effectively to quickly changing markets, environments and customers. That is why Pentair is the company that businesses, communities and individuals turn to for the answers that fit their most vital everyday needs and their most visionary long-term goals.

We believe in conducting business with absolute integrity. Efforts in continuous improvement, high performance, cost reduction and business ethics have contributed greatly to our success and will continue to add value for our employees, customers, suppliers, and shareholders.

Pentair choses suppliers who are passionately committed to exceeding expectations and continuously improving velocity while reducing the *Total Cost of Ownership*. Our suppliers' ultimate goal must be to provide exceptional value. We must work together to eliminate waste and increase quality and speed across an extended supply chain. As a Pentair supplier, you are critical to our ability to meet and exceed our customers' expectations.

In order to achieve success, Pentair and its chosen suppliers must share common goals and strategies. We must understand each other's needs and work cooperatively together. Communication is the key to collective cooperation and must start in the advanced planning stages of product development.

Pentair Global Locations



The Americas

Anaheim, California
Anchorage, Arkansas
Andrews, Indiana
Angleton, Texas
Anoka, Minnesota
Ashland, Ohio
Atlanta, Georgia
Aurora, Colorado
Baton Rouge, Louisiana
Baytown, Texas
Black Mountain, North Carolina
Boituva, Brazil
Bolingbrook, Illinois
Bridgeport, New Jersey
Brookfield, Wisconsin
Buenos Aires, Argentina
Buenos Aires, Argentina
Burlington, Canada
Calgary, Canada
Caxias do Sul, Brazil
Chardon, Ohio
Chicago, Illinois
Chino, California
Círdoba, Mexico
Col. Palmas Polanco, Mexico
Conroe, Texas
Corona, California
Cullam, Alabama
Cypress, California
Delavan, Wisconsin
Denham Springs, Louisiana
Dover, New Hampshire
Edmonton, Canada
Everett, Washington
Fort Mcmurray, Canada
Glendale, Wisconsin
Grande Prairie, Canada
Guadalajara, Mexico
Hanover Park, Illinois
Harlingen, Texas
Houston, Texas
Kansas City, Kansas
Lagrangeville, New York
Lakewood, New Jersey
Laval, Canada
Malvern, Pennsylvania
Mexico City, Mexico
Miami Lakes, Florida
Miami, Florida
Midale, Canada
Minatitlán, Mexico
Minneapolis, Minnesota
Monterrey, Mexico
Moorpark, California
Mount Sterling, Kentucky
New Brighton, Minnesota
North Aurora, Illinois
Pasadena, Texas
Pelham, Alabama
Philadelphia, Pennsylvania
Posen, Illinois
Princeton, New Jersey
Prophetstown, Illinois
Radford, Virginia
Redwood City / Menlo Park, California
Reno, Nevada
Reynosa, Mexico
Rockford, Illinois
Saddle Brook, New Jersey
San Diego, California
Sanford/Erwin, North Carolina
Santiago, Chile
Sao Paulo, Brazil
Scarborough, Ontario
Schaumburg, Illinois
St. Louis, Missouri
St. Paul, Minnesota
Stafford, Texas
Tampico, Mexico
Trenton, Canada
Varennes, Canada
Warwick, Rhode Island
Whitecourt, Canada
Winamac, Indiana

Europe, Middle East, and Africa

Aberdeen, UK
Abu Dhabi, UAE
Almelo, The Netherlands
Amstelveen, Netherlands
Armentiüres, France
Assago, Italy
Atirau (Kazakhstan), Russia
Barcelona, Spain
Bergen, Norway
Beringe, Netherlands
Betschdorf, France
Biblis, Germany
Bonn, Germany
Borás, Sweden
Breda, Netherlands
Bridgend (Mid Glamorgan), UK
Buc, France
Burgos, Spain
Cambridge, UK
Cergy-Pontoise Cedex, France
Coleshill (Birmingham), UK
Crawley, UK
Dammam, Saudi Arabia
Drùbak, Norway
Dubai, UAE
Dzierzoniow, Poland

Europe, Middle East, and Africa Cont.

Elst, Netherlands
Enschede, The Netherlands
Erhard, Germany
Feyzin, France
Gauteng, South Africa
Gothenburg, Sweden
Groûenkneten, Germany
Gùvle, Sweden
Ham, France
Heerle, Netherlands
Heidelberg, Germany
Heidenheim, Germany
Herentals, Belgium
Hertfordshire, UK
Heusenstamm (Schmieding), Germany
Holzwickede (Schmieding), Germany
Houilles, France
Jeddah, Saudi Arabia
Jubail, Saudi Arabia
Korschenbroich, Germany
Leeds, UK
Legutiano, Spain
Les Milles, France
Leuven, Belgium
Lausanne, Switzerland
Milan, Italy
Ludwigshafen, Germany
Lugagnano Val D'arda (Piacenza), Italy
Lugnano, Italy
Madrid, Spain
Malmö Sweden
Market Harborough, UK
Mönchengladbach, Germany
Merignac, France
Meyzieu, France
Mölaga, Spain
Montespertoli, Italy
Moscow, Russia
Munguia, Spain
Neumarkt-St. Veit (Frischhut) , Germany
Novara, Italy
Oldenzaal, Netherlands
Or Aqiva, Israel
Oslo, Norway
Peitz, Germany
Perrigny, France
Pfarrkirchen (Frischhut), Germany
Pisa, Italy
Poznan, Poland
Pregnana, Italy
Remscheid (Manibs), Germany
Riesbürg, Germany
Saint Juery, France
Saint-Ouen L'aumîne, France
Saint-Petersburg, Russia
Saint-Thibault Des Vignes, France
Sevilla, Spain
Sharjah, UAE
Siegen, Germany
Skarpnack, Sweden
Skelmersdale, UK
Sneek, Netherlands
Sosnowiec, Poland
Stavanger, Norway
Steinhagen, Germany
Stockholm, Sweden
Strate, Germany
Straubenhardt, Germany
Swietochlowice (Katowice), Poland
Toledo, Spain
Trollhùttan, Sweden
Trondheim, Norway
Valencia, Spain
Valladolid, Spain
Venlo, The Netherlands
Vitrolles, France
Vùstervik, Sweden
Warszawa, Poland
Washington (Newcastle), UK
Wesseling, Germany
Wiehl, Germany
Winterswijk, The Netherlands
Zenderen, The Netherlands

Asia/Pacific-Rim

Adelaide , Australia
Alexandra, New Zealand
Ansung, Korea
Auckland, New Zealand
Bengaluru, India
Bangkok, Thailand
Baroda Halol, India
Beijing, China
Blenheim, New Zealand
Brisbane, Australia
Broome, Australia
Bunbury, Australia
Busan, Korea
Chengdu, China
Chennai, India
Chiba, Japan
Christchurch, New Zealand
Chugoku, Japan
Coffs Harbour, Australia
Collie, Australia
Currumbin, Australia
Dalby, Australia
Darwin, Australia
Delhi, India
Devonport, Australia
Dubbo, Australia
Dunedin, New Zealand
Exeter, Australia
Gao, India
Gladstone, Australia
Goondiwindi, Australia
Griffith, Australia
Guangzhou, China
Hamilton, New Zealand
Hastings, New Zealand
Hokkaido, Japan
Hong Kong, Hong Kong
Huzhou, China
Jakarta, Indonesia
Kalgoorlie, Australia
Kaohsiung, Taiwan
Karratha, Australia
Kashima, Japan
Kobe, Japan
Kolkata, India
Kuantan, Malaysia
Kurashiki, Japan
Kyusyu, Japan
Lanjigarh, India
Longford, Australia
Mackay, Australia
Meiwa, Japan
Melbourne, Australia
Mildura, Australia
Mooroopna, Australia
Mt Gambier, Australia
Mt. Isa, Australia
Mudgee, Australia
Mumbai, India
Nagoya, Japan
Naracoorte, Australia
New Delhi, India
New Plymouth, New Zealand
Newcastle, Australia
Newman, Australia
Nowra, Australia
Osaka, Japan
Pakenham, Australia
Parabadoo, Australia
Pentrose, New Zealand
Perth, Australia
Petaling Jaya, Malaysia
Port Hedland, Australia
Pune, India
Qingdao, China
Queensland, Australia
Rayong, Thailand
Robinvale, Australia
Sale, Australia
Seoul, Korea
Shanghai, China
Shenzhen, China
Shepparton, Australia
Singapore City, Singapore
Suzhou, China
Swan Hill, Australia
Sydney, Australia
Taichung, Taiwan
Taipei, Taiwan
Tamilnadu, India
Tamworth, Australia
Tokai, Japan
Tokyo, Japan
Tom Price, Australia
Toowoomba, Australia
Townsville, Australia
Tuas, Singapore
Urawa, Japan
Vizag, India
Wellington, New Zealand
Welshpool, Australia
Xi'an, China
Yarrawonga, Australia
Yokohama, Japan

Pentair Vision

At Pentair, we **"Improve Every Day" and "Win Right."** Those two phrases embody both our drive for success and our dedication to doing business led by the highest ethical standards. We believe that honesty and integrity should define our relationships with customers, business partners, investors, and each other.

Vision → To be a diversified industrial growth company, global enterprise and responsible citizen known for operational excellence, innovation, top talent and growing by serving customers well to deliver superior long-term shareholder value.

Pentair's founders created our Code of Business Conduct to guide the company's development and actions. This Code is the foundation for specific practices, policies and guidelines that determine how we conduct day-to-day business. It includes guidance for all employees regarding how we will:

- Manage Pentair according to the highest business, ethical, moral and civic standards.
- Operate in a manner that earns the respect of our shareholders, employees, communities, customers, suppliers and all others with a stake in our success.
- Make Pentair a top-performing company, managed for the long-term benefit of all of our constituents.

Pentair has developed a Supplier Code of Conduct sharing the same high expectations. We expect our suppliers to comply with the Supplier Code of Conduct to ensure safe and healthy working conditions, the human rights of workers, high ethical standards and environmental responsibility. The Supplier Code of Conduct can be found on the Supplier Information Website at www.Pentair.com or by clicking HERE.

Table of Contents

1.0 Introduction

1.1. Objective

The purpose of this document is to outline the processes used by Pentair to ensure all members of the supply base understand our expectations. Pentair intends to only do business with Suppliers who provide high quality parts, materials, and services consistent to applicable specifications, at a competitive price, and inside the defined delivery schedule. This document details how to become an approved Supplier and sets forth the requirements for continuous improvement and communication.

1.2. Scope

These guidelines are applicable to both existing and new Suppliers of materials, parts, assemblies, and services that directly impact Pentair. Note that we expect our Suppliers to hold *their* suppliers and contractors to the same standards.

1.3. Definitions

Pentair – All Pentair companies.

Suppliers – Suppliers of material, parts, assemblies and services for Pentair.

Note: Additional definitions can be found in **Appendix A**

1.4. Responsibilities

Pentair:
Pentair is responsible for implementing this Guide, educating Suppliers on its use, updating it and communicating the latest revisions to Suppliers.

Suppliers:
Suppliers are responsible for understanding the contents of this Guide, ensuring the use of the forms and processes provided herein, and making sure that they and their sub-suppliers otherwise comply with the letter and the spirit of this Guide.

2.0 General

2.1. Pentair's Supplier Code of Conduct; Compliance With Applicable Regulations

Pentair expects its Suppliers and their employees to conduct themselves in an ethical, professional manner at all times. We believe in maintaining an environment free from harassment and discrimination and in treating all people with dignity and respect. Pentair will, therefore, act promptly on any suspected violations of this policy and will align only with those Suppliers who share and respect this policy in all facets of business.

A candidate Supplier must comply with Pentair's Supplier Code of Conduct. They must be appropriately registered and licensed to provide the proposed products or services in compliance with all applicable laws and regulations. They must consistently observe general business ethics including energy saving & environment protection, child labor control, respect for customer, employee and business partners, respect for intellectual property, and confidentiality commitment.

2.2. Standard Terms and Conditions; Legal Relationship

This Supplier Guide sets forth certain *minimum* terms which we expect of our Suppliers. These terms are additional to those set forth in applicable written agreements, bid requests, Purchase Orders (P.O.) and the Pentair buyer's specifically applicable terms and conditions of purchase (sent with or incorporated by P.O.). Note that - except where superseded by written agreement or terms and conditions of purchase - the sale of all products to Pentair is subject to and governed by the applicable Pentair standard terms and conditions of purchase associated with the P.O. received by the supplier. Note, too, that in the event of any inconsistency whatsoever, the parties' written agreement, if one exists, governs.

Please note that Supplier's business relationship is with the particular Pentair operating company which is buying the goods/services ONLY and *not* with Pentair PLC or any other Pentair company.

2.3. Intellectual Property

All information, drawings, materials, goods and equipment provided to Suppliers by Pentair or arising from work or services done for Pentair shall be treated as confidential and proprietary to Pentair and shall not be disclosed or shown to others without prior written permission of Pentair. Suppliers will be asked to sign Pentair's Non-Disclosure Agreement and must otherwise diligently protect such information.

3.0 Requirements and Expectations

3.1. Regulatory Requirements

Suppliers are expected to behave and operate ethically in every way. Suppliers must strictly comply with Pentair's Supplier Code of Conduct and with all applicable statutes, laws and regulations. Some, but not all, of such requirements are discussed below.

3.1.1. Anti-Corruption

Suppliers must at all times conduct their activities in accordance with all applicable laws, rules, regulations and orders related to anti-bribery or anti-corruption legislation including, but not limited to, the U.S. Foreign Corrupt Practices Act of 1977. Accordingly, Suppliers will make no offer, payment or gift, will not promise to pay or give, and will not authorize, directly or indirectly, the promise or payment of, any money or anything of value to any Pentair employee or agent, any government official, any political party or its officials, any candidate for political office, any official or employee of a public international organization or any person while knowing or having reason to know that all or a portion of such money or item of value will be offered, given or promised for the purpose of influencing any decision or act to assist Supplier or Pentair or otherwise obtaining any improper advantage or benefit.

3.1.2. Environmental, Health and Safety

Suppliers are expected to provide their employees with a safe working environment that supports accident prevention and minimizes exposure to health risks. Suppliers must also comply with all applicable environmental, health and safety laws and regulations (ex: anti-lead, REACH, RoHS, ISPM 15, Transportation HazMat Regulations, etc.). When requested, Suppliers shall submit to Pentair written product specifications, operating procedures and other information that pertain to environmental compliance.

Pentair is committed to designing, manufacturing, and distributing our products and providing services to our customers in a safe and responsible manner. We care about the health and safety of our workers, our customers, the communities in which we operate, and the environment. Pentair promotes a work environment philosophy of 'work right', where safeguarding our people and the environment is integral to our operations. Our Suppliers are expected to adhere to the same philosophy.

3.1.3. Country of Origin; Free Trade Agreements

Pentair requires its suppliers to identify the country of origin of each article (product/component) on both the product itself and on every level of packaging and to provide proper documentation on every shipment to comply with all applicable laws and regulations. Pentair depends on its Suppliers to provide us with the information to enable our own products to comply with select free trade agreements, where applicable. Accordingly, Suppliers must provide a clear statement of whether or not its products qualify for any free trade agreements.

Country of origin information is mandatory. Unmarked articles may be subject to additional duties or may be seized or destroyed by customs. Moreover, non-compliant shipments and paperwork can cause significant audits, penalties, delays, and forfeitures for you, us and/or our customers. Please note this is not a one-time requirement. Country of origin documentation and product marking is now required at first shipment of any product/component and must be updated at least annually or earlier if the applicable origin changes before the year is through.

Contrary to a common misconception, the following rules usually apply to both domestic and international transactions.

1. Products/components must be marked with country of origin (unless we agree that it qualifies for a clearly applicable exception).
2. All levels of packaging must be marked with country of origin.
3. All sales invoices and packing lists must provide country of origin information.

3.1.4. Conflict Minerals

Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act ("the Dodd-Frank Act") and the corresponding final rule by the U.S. Securities and Exchange Commission ("SEC") places reporting requirements on publicly traded companies such as Pentair whose products contain metals derived from minerals defined as "conflict minerals." The Dodd-Frank Act currently designates cassarite, columbite-tantalite (coltan), wolframite, or their derivatives tantalum, tin and tungsten, respectively, and gold as "conflict minerals." More information on the final rule can be found at http://www.sec.gov/news/press/2012/2012-163.htm.

Pentair is required by the SEC to disclose annually whether conflict minerals necessary to the functionality or production of its products it manufactures or contracts to manufacture originated in a "Covered Country" and are not "DRC conflict free." According to the SEC's final rule, DRC conflict free minerals are those minerals used in manufactured products that did not directly or indirectly finance or benefit armed groups within the Democratic Republic of the Congo, Angola, Burundi, the Central African Republic, the Republic of the Congo, Rwanda, South Sudan, Tanzania, Uganda, or Zambia. This term also applies to materials determined to be processed from scrap and/or recycled material.

To enable Pentair to comply with the SEC disclosure requirements, Suppliers will be required to respond to an annual request to certify the product delivered to one or more Pentair locations is DRC conflict free. Non-U.S based companies, privately owned companies, and distributors are not exempt from this Pentair requirement. Suppliers will also be required to support Pentair's compliance with any future requirements of other legislative bodies worldwide.

NOTE: It is considered a part of doing business with Pentair to cooperate with the requirements of our conflict free due diligence processes. Suppliers that do not comply with Pentair requirements may be evaluated as part of our Risk Mitigation plan.

Suppliers must provide their response via the method specified in the request communication. The due diligence process utilized to determine the existence of any conflict minerals and their country of origin must be documented and information retained for Pentair review at any time. The country of origin determination will need to trace any of the subject minerals to where they were mined or refined. A list of validated smelters should be submitted as part of the declaration. Suppliers will need to complete the latest version of the CFSI Conflict Minerals Reporting Template (CMRT) as part of the declaration process to validate they are "Conflict Mineral free" for the product they supply to Pentair. The template can be found at http://www.conflictfreesmelter.org/ConflictMineralsReportingTemplateDashboard.htm.

Suppliers may be evaluated on the strength of their internal Conflict Minerals Program. Evaluation criteria will include the following:

- Company Conflict Minerals sourcing policy exists and is posted on a public website.

- Direct suppliers are required to provide due diligence information in conformance with the CFSI CMRT, and source only from smelters identified by an independent audit firm to be Conflict Mineral free.
- Due diligence measures have been implemented to collect information from suppliers, review information against Company expectations, and manage any corrective actions as a result of the review process.

3.1.5. Import / Export

On international shipments, Suppliers must ensure that the export controls of both the USA and the originating country (if non-USA) are met. For all destination countries that require pre-shipment inspection, consular legalization, or ISF/ENS-type destination Customs filings, Supplier shall ensure that these programs are performed accurately and timely enough to be fully compliant at least three days before their respective deadlines, or vendor shall accept the resulting penalties.

Suppliers must file import / export paperwork in a timely and accurate manner that declares full and appropriate values to ensure accurate duty assessment. Without limiting the foregoing, if pre-payments, customer-provided tooling, or other dutiable assists have been provided, Supplier shall ensure that they are properly declared.

On international shipments, Suppliers must ensure that all solid wood packing materials (pallets, crates, blocking/bracing lumber, and other dunnage) are both treated and clearly marked in full compliance with ISPM-15 regulations.

3.1.6 ITAR

Certain Pentair facilities are approved International Traffic in Arms Regulations (ITAR) facilities. Any Supplier providing product or services to an ITAR approved Pentair facility must adhere to applicable ITAR regulations and requirements. Additional ITAR requirements can be found on the US Department of State's website.

3.1.7 ISF Compliance

All Suppliers of material being delivered to any US seaport on ocean carriers are required to provide the U.S. Customs and Border Protection (CBP) with advance notification for all ocean vessel shipments to the United States. This notification is identified as an Importer Security Filing (ISF) and, as of date of this publication, must be accepted by U.S. Customs at least 24 hours prior to cargo lading aboard a vessel. This process generally requires at least a week of careful cooperation between the vendor, freight forwarder and Customs broker in advance of pickup. All Pentair Suppliers who require ocean shipment of material must comply with this directive in order to continue to be a Supplier to Pentair. Many other destination countries have programs similar to ISF; we require full compliance with such programs.

3.1.8 EU Import Compliance

The European Union (EU) requires the electronic filing of an Entry Summary Declaration (ENS) for all imports into EU member countries. Similar to the ISF for the US, the ENS is lodged electronically at the Customs office of the member country port of entry before the goods are brought into the customs territory of the EU. The Supplier must ensure that the Carrier lodges the ENS. Guidelines are available at the following site: http://ec.europa.eu/ecip/security_amendment/procedures/index_en.htm.

Timing requirements, as of date of this publication, are as follows:

- For ***sea freight***, the European 24 Hour Rule requires that the ocean carrier file with the relevant national Customs authority in the EU an ENS for all shipments that will be carried on a vessel that will call one or more ports in the EU.
- For ***airfreight***, 4 hours before entering the EU
- For ***road transport***, one hour before entering the EU

The EU rules prescribe the data elements that must be included in the ENS. An incomplete ENS will be rejected by the Customs authorities. A shipment for which an ENS has not been filed and accepted by Customs may not be loaded

3.1.9 Prohibited Countries & Entities; Denied Party Screening

Pentair policy prohibits any Pentair company from conducting business with any countries or entities restricted by U.S law. Pentair requires all vendors, both domestic and international; to ensure that they do not sell Pentair anything manufactured or touched by a prohibited country or entity. Denied Party Screening is the process of screening those parties involved in an export transaction for the purpose of complying with the applicable standards of the U.S. Government.

3.1.10 US Supplier Notification of Affirmative Action Efforts

Pentair is a United States federal contractor obligated to take affirmative action to employ women, minorities, disabled individuals, and veterans. Pentair is also required to inform those with whom it conducts business that they, too, may have such obligations. By operation of law, as well as by this notification, the Equal Employment Opportunity Clause required under Executive Order 11246, (41 C.F.R. 60-1.4), the affirmative action commitment for special disabled veterans and veterans of the Vietnam Era set forth in 41 [C.F.R. 60-300.44(f)(1)(ii)],the Affirmative Action Clause for Section 503 of The Rehabilitation Act of 1973 set forth in 41 [C.F.R. 60-741.44(f)(1)(ii)], and the related regulations of Secretary of Labor, (41 C.F.R)., Chapter 60, are incorporated in all of our contractual relationships with our Suppliers.

This notification does not necessarily mean that all Suppliers have any or all of the affirmative action obligations referenced above. This will depend upon a number of factors, including the dollar amount of the transaction(s) and the size of your workforce.

3.1.11 Counterfeit Parts

Counterfeit parts, either mechanical or electrical, are defined as suspect parts that are either copies or substitutes without legal right or authority to do so whose material, performance, or characteristics are knowingly misrepresented by a supplier in the supply chain.

Pentair Suppliers are responsible for ensuring that the components provided or used in assemblies provided to Pentair are not counterfeit. Components should be purchased, whenever possible, directly from the original component manufacturer or from their authorized distributors.

Suppliers should have documented formal procedures for selecting, approving, and monitoring their suppliers. As part of the procedures Suppliers should address control, disposition, and reporting of counterfeit material.

3.2. Lean Enterprise

Pentair's operational excellence philosophy and methodology is based on lean enterprise thinking and processes. We view ourselves as extensions of our customers' supply chains, and our Suppliers as extensions of our supply chain. We look to reduce waste and increase velocity and quality across the entire value stream. Suppliers who adopt and demonstrate similar thinking and practices will grow with Pentair, while those who do not will shrink over the long term.

3.2.1 Pentair Integrated Management System

At Pentair we have developed an integrated framework of lean management tools that we have labeled "Pentair Integrated Management System" (PIMS). The core principle of PIMS is to make Pentair products and services more valuable to our customers by eliminating waste in everything we do. This "lean" approach to our work means constantly striving to streamline our operations and enabling employees to be as productive as possible. Through continuous improvement, we can increase our speed-to-market, product quality and innovation, and the growth of our business.

3.2.2 Supplier Lean and Continuous Improvement

PIMS is an essential part of Pentair's culture and critical to our future success. We expect our Suppliers to implement continuous improvement programs to align themselves with the Pentair lean culture. Suppliers must continually strive to proactively improve product quality, to remove waste wherever possible and to constantly improve lead times both internally and at their sub-suppliers to reduce inventory. Pentair's Suppliers are encouraged to develop review procedures and audit plans, and to use a visual management philosophy in order to accomplish this. It is essential that continuous improvement programs reach all levels of the company to ensure all employees gain a sense of ownership in the program.

Examples of continuous improvement activities include:

1. Value Stream Mapping – Level loading the line. Optimizing productivity.
2. CCF (Creating continuous flow)
3. MMF (Making material flow)
4. 8D/RCCM (Root cause counter measure) – Problem solving methodology.

5. Supplier Lean Development – Suppliers working with their suppliers to improve productivity.

Pentair is committed to helping suppliers in their continuous improvement efforts including but not limited to training and leading activities at the supplier.

3.3. Quality

Suppliers who fail to meet and maintain quality standards will not earn or retain business. Suppliers are required to provide goods that conform to Pentair specifications. Suppliers are expected to proactively prevent defects and show downward non-conformance trends. If Pentair discovers a non-conformance or defect, Suppliers must provide prompt and effective corrective actions based on systematic and effective problem solving techniques.

Suppliers must demonstrate a top-down commitment to quality and continuous improvement. This commitment should be evident in the Supplier's quality planning, quality control, and quality improvement processes. Pentair prefers that its Suppliers have quality systems that are registered to the ISO-9001 and/or TS16949, ISO13485 standards. The quality system must include the following at a minimum:

- Quality Manual
- Procedures for incoming, in-process, and final inspection
- Process Control Plans
- Procedure for the control of non-conforming materials
- Procedure for Corrective Action Response (CAR)
- Test equipment and gage control system
- Documentation control
- Internal/External failure rate data

Suppliers must notify Pentair when changes that materially affect the status or scope of the Supplier's quality system occur.

In addition to a quality system, Suppliers should have a quality policy and specific quality indicators. A system should be present to track quality metrics and monitor for negative trends. It should also be visible throughout the Supplier's organization.

3.3.1 Technology

Suppliers are expected to use the most current levels of technology available and appropriate for the design and production of quality goods and services. This may include equipment and resources which support bringing new products to market faster, including rapid prototyping capability.

Suppliers must have the ability to communicate electronically with Pentair. Supplier processes should be computer integrated to aid in the analysis of data, to assist with corrective action activities, and to provide timely communication.

3.3.2 Document Control

Pentair uses prints and other controlled documentation to communicate material requirements. Pentair will provide the latest revisions of controlled documentation to the appropriate person identified by the Supplier. Suppliers must have a written procedure for controlling these documents and will use the latest revision for purchasing, supplying, and inspecting based on the purchase order requirements. All superseded documents will be marked "OBSOLETE." It is the Supplier's responsibility to assure they have all current documentation required.

3.3.3 Equipment

Suppliers may use any test and measurement equipment deemed necessary to meet Pentair requirements. When Pentair requires the use of certain equipment, it will be specified on Pentair documentation, and this equipment must then be used.

Inspection gages along with test equipment shall be controlled and the periodic calibration cycle shall ensure accurate measurements. Suppliers shall treat all equipment with reasonable care to prevent loss, damage or out-of-calibration conditions. Suppliers shall not ship product to Pentair tested with equipment that is not in calibration or not in good working order.

In order to assure the precision of measuring and testing instruments, Suppliers are required to have written control procedures and enforce periodic inspection and calibration. Supplier's gauging and testing equipment shall be made available to Pentair representatives upon request for correlation with Pentair measurement methodology. Any apparatus used to accept or reject product during production is considered to be a measurement device and is subject to control.

3.3.4 Tooling

Suppliers are responsible for the care, maintenance, and proper use of Pentair tooling and fixtures. When appropriate, Suppliers will be required to submit a Tooling Details form prior to production approval which is shown in **Appendix B**. All tools should be clearly marked with the Pentair name and a tool number.

All Suppliers are expected to maintain tool maintenance logs and be able to provide them to Pentair when requested. Supplier must use Pentair's Tool Log or an approved equivalent. Pictures of all tooling are required. Instructions are included in Pentair's Tool Log on how to properly identify tooling during the photographing of tools. Pentair requires that Suppliers immediately report any loss or damage to tooling. Unless otherwise agreed to in writing, storage and regular maintenance of Pentair tooling is Supplier's responsibility. Suppliers shall notify Pentair when a tool is nearing the end of its useful life in time to repair or replace the tool without interruption to continuous production. Tools are expected to be adequately packaged and protected from damage if and when they are sent out for repair or rework. Suppliers are responsible for assuring that the tooling is capable of producing product within Pentair specifications at all times.

3.3.5 Quality Records

Unless otherwise specified by Pentair, Suppliers are responsible for maintaining records and test specimens in accordance with the Supplier's quality system requirements. Data records shall include at a minimum, without limitation, the following:

- Records of Inspection and Test Results
- Production lot size
- Inspection and test dates
- Quantities checked
- Items checked
- Quantity of defects found, method of remedy
- Control Records of Inspection Tools and Test Equipment Calibration

Included in each of the above mentioned items shall be inspection frequencies, schedules, inspection results, and corrective actions. Quality records shall be retained at a minimum for the duration of the warranty of the final product.

3.3.6 Part Approval and Material Traceability

Pentair's Suppliers must have a quality system that ensures parts are produced with the correct material. Suppliers shall establish and maintain documented procedures for accurately identifying product from receipt through all stages of production and delivery. Suppliers shall meet the following requirements:

- Maintain material traceability to a heat/lot number and material properties
- Produce material certificate reports per applicable standards as required
- Perform positive material identification (PMI) tests to verify material type
- Provide evidence of controls in place to prevent the shipment of incorrect material

Prior to placing the first production order for parts or services, Pentair requires (in most cases) the Supplier to submit samples and inspection documentation per the Production Part Approval Process (PPAP) which is covered in a later section. In some cases a First Article Inspection (FAI) process may be used instead of a PPAP. Once these parts have been approved for production utilizing the PPAP or FAI process, if any changes occur that affect the production part or process to manufacture it, then a new/revised PPAP or FAI is required. It is imperative that Pentair is promptly notified of any changes that affect part qualifications! The following changes may require re-qualification and the completion of a PPAP or FAI:

- New or different Sub-Supplier
- A part change is made which results in a part revision or new part number at the Supplier
- New or revised tooling
- Supplier material, equipment, or process change
- New of changed manufacturing location (even within the same plant)

3.3.7 Supplier Change Requests

All requests for deviations shall be submitted to your Pentair contact, whether the deviation is driven by Pentair or by the Supplier. Such deviations include changes to designs, drawings, specs, material, component, equipment, equipment locations, die, tool, mold, or to any production method, or a change in source of supply or manufacturing, assembly or delivery process. If the request is approved, a deviation will be sent back to the Supplier to allow the requested change.

The types of changes that require Pentair approval are clearly defined herein and within our Production Part Approval Process (PPAP). Suppliers are required to obtain approval by submitting a Supplier Deviation or Change Request form (located in **Appendix H** or by contacting your Pentair supply chain representative). For changes that do not require validation via PPAP, the form will be signed and returned to the Supplier. For changes that require PPAP, a signed PPAP will be used as authorization.

Failure to comply with these requirements exposes both companies to financial risk and litigation. Suppliers that make unauthorized changes will be responsible for the accumulating expenses associated with the unauthorized change. Additional ramifications may include removal from our Approved Supplier List.

3.3.8 Pentair Change Requests

Pentair frequently makes changes to its products. These changes can affect product revision levels, prints, testing firmware, etc. Affected Suppliers will be notified directly or via the

respective product change order process. It is recommended that you attach a opy of the approved request documentation to the initial shipment of product affected by the change.

3.3.9 Non-Conforming Material

If Pentair identifies a non-conforming product, it will be rejected and Pentair will segregate the material. Pentair will then notify the Supplier and provide as much identifying information about the non-conforming product as possible. Suppliers are responsible for the cost of poor quality and are required to immediately 100% inspect, segregate and correct similar parts within their own facilities to ensure that Pentair will not receive additional shipments of suspect product. The cause of the non-conformance shall be identified and controlled.

Rejected product will be subjected to one of the following actions in Pentair's discretion:

- Return to Supplier at Supplier's cost for full credit or refund, including shipping
- Return to supplier for rework at Supplier's cost – all rework shall be completed to the drawing requirements
- Scrap at Supplier's cost for full credit or refund
- In special cases (ex: non-conformance jeopardizes production delivery dates being met), Pentair may 100% inspect or rework the material onsite, with the Supplier debited for the associated costs

Supplier shall establish and maintain as part of its quality system a plan and procedure for the control of defective goods to avoid shipment to Pentair. These goods shall be segregated and shall be identified separately by container, color, or tag for the purpose of preventing their use, shipment, or mixing with acceptable goods.

3.3.10 Corrective Action

Supplier shall appoint a qualified representative within its organization who has the responsibility and authority to resolve quality matters. This person(s) shall be of a level to effectively interact with Supplier management and also with Pentair to resolve quality issues. The representative shall provide written corrective action in a timely manner on the Pentair Corrective Action Request (CAR) as required.

Suppliers shall begin to resolve issues associated with discrepant parts immediately upon notification by Pentair and shall provide a response to all CAR's within the requested timeframe.

Pentair determines whether or not a CAR should be issued based on the seriousness or impact of the issue on the quality of Pentair product. The Pentair CAR system facilitates the prompt investigation, correction, and prevention of non-conformances. Upon receipt of a CAR, Suppliers shall respond with the following information:

- **Containment Action:** Short-term and Long-term corrective and containment actions such as reprocessing, sorting, reworking. All potentially affected products must be addressed at this time, and notification and disposition of the material must be made with the intent to limit any possible exposure to Supplier, Pentair and Pentair's customers.

- **Root Cause:** The Supplier must conduct in-depth analysis to determine the true cause(s) of the non-conformance. Problem solving tools such as 8D (detailed below), 5 Why's, A3 and DMAIC should be used to drive towards root cause.

- **Permanent Corrective action:** Permanent action taken to eliminate the problem and the possibility of reoccurrence. Methods that may be used are mistake-proofing systems (Poka-yoke), training, process changes, or tool changes. Corrective actions

should not be closed until validation has been completed and corrective action was deemed effective.

Pentair will indicate the response due date for the Supplier to return the CAR. The Supplier may request extensions. Suppliers are expected to maintain a corrective action program with *their* suppliers.

8D steps identified:

1. **General Information:** Supplier/Part Number – Person/Team Responsible, Date of issue, target date for completion, etc.
2. **Problem Description:** Define Problem: Ask who, what, why, where, when, how much, how many, and how often. Make sure to describe what the problem causes.
3. **Containment and Short Term Solution:** List Interim Containment Actions – This includes any temporary actions to contain and/or 'fix' the problem until permanent corrective action is in place. While this is typically some kind of sorting, there could also be other short term ways to protect the customer.
4. **Root Cause Analysis:** Analyze for root cause of the problem – Use RCCM, 5 Whys, Fishbone, FTA, and other tools to determine the root cause(s) of the issue.
5. **Identify Solution(s):** Identify Solutions that address the root cause. List and rank the causes to determine which one(s) have the greatest impact. In many cases there is more than one solution.
6. **Validation:** Implement and validate that corrective action does what it is supposed to do. Create a test plan to make sure the solution not only fixes the problem, but does not cause a new problem.
7. **Prevention (design/information systems review):** Determine what improvements in system and processes would prevent this problem. This includes updating documentation like control plans, D/P FMEAs, drawings, etc.
8. **Congratulate Team**

3.3.11 Warranty and Liability

If either party becomes aware of a potential manufacturing or design 'Defect' in a product (material, parts, assemblies, and/or services supplied by Supplier to Pentair), that party will promptly deliver written notice of the potential Defect to the other party's designated recipients. Supplier must then provide analysis related to the potential Defect as requested by Pentair. Supplier will cooperate with Pentair to promptly implement appropriate corrective and preventative actions including the delivery of corrected replacement product at no cost to Pentair or its customers.

3.3.11.1 Product Warranty

Pentair's end-user warranty terms vary depending on the product and channel through which the product is sold. In any event, Supplier's warranty period must match or exceed Pentair's applicable end-user warranty period. Pentair and Supplier may agree in writing to different warranty terms for specific products, categories of products, and/or geographic locations.

At a minimum, Suppliers must provide Pentair with the following warranties:

- All products must be fit for sale, of good material and workmanship, and free from defect
- Products must be transferred to Pentair free and clear of all claims or encumbrances
- All Products will be manufactured, processed, packaged, labeled, marked, tested, certified, weighed, inspected, loaded, shipped and sold by Supplier in compliance with all applicable drawings and specifications, laws, rules, regulations and standards.

In the event that Pentair is obligated to repair or replace a product due to a Defect in a Supplier-provided product, the following will occur:

- Supplier will promptly correct the Defect through repair, replacement or refund (at Pentair's discretion) at no charge to Pentair
- Supplier will promptly reimburse Pentair for any of the following related costs (ex: diagnosis, removal, shipping, installation, rework, testing, etc.)
- If requested by Supplier, Pentair will return a representative sample of defective product to Supplier at Supplier's Expense.

3.3.11.2 Liability, Indemnity & Hold Harmless

Pentair's Suppliers will defend, indemnify and hold harmless all Pentair companies, and their respective directors, officers, employees, agents, and customers from and against any and all claims, actions, demands, damages, losses, judgments, settlements, costs and expenses, including without limitation attorneys' fees, arising out of or in connection with any of the following:

- Mandatory or discretionary recall of Supplier product by Pentair, a customer thereof or any regulatory entity for safety or other reasons;
- Alleged infringement of any intellectual property right of any third party in connection with the products or any unfair competition involving the products;
- Death of or injury to any person, damage to any property, or any other damage or loss, by whomsoever suffered, allegedly resulting from or relating to the products or services supplied by Supplier;
- Alleged or actual violation by Supplier or its products of any laws, rules, ordinances or regulations;
- Breach of any agreement, late delivery or product non-conformance by Supplier;
- Claims by or on behalf of Supplier's subcontractors, vendors, employees or agents.

In the event that Pentair's customers or others sue or threaten to sue Pentair, Supplier and/or other parties (individually, a "Product Liability Action") alleging that services or products, alone or in combination, caused personal injury, death and/or property damage; Pentair and Supplier will cooperate with each other in managing and defending Products Liability Actions. Note that this in no way limits Supplier's defense, indemnity and hold harmless obligations as described above.

Suppliers are required to maintain appropriate insurance policies including without limitation commercial general and products liability insurance policies as specified by Pentair from time to time. Pentair shall be named as additional insured on such policies. At all times including at start of the relationship, Suppliers must work with their Pentair contact to determine the correct policy coverage's and amounts.

3.3.12 Use of Statistical Tools and Problem Solving Techniques

Suppliers must be committed to improving quality through preventive and corrective action programs. Such programs may include group problem solving and employee

involvement programs. Additionally, Suppliers should use the appropriate statistical tools required to establish, control and verify product quality. These tools include, but are not limited to, statistical concepts such as Pareto analysis, Gage R&R, Cause and Effect diagrams, Design of Experiments, Statistical Process Control, and Mistake Proofing.

The use of such tools should be required by the Supplier's quality system and documented in the control plan, capability studies, and other quality records. In addition to verifying compliance with specifications, these tools should be used to develop solutions to problems and to identify opportunities for improvement.

3.4 Delivery

Suppliers are required to provide goods on time to all Pentair locations. Pentair default standard delivery terms for delivery are three days early and zero days late unless otherwise agreed to by the business unit or Pentair entity being supplied. Suppliers are expected to coordinate flow of material and information to Pentair. Suppliers should be flexible, provide short lead-times and respond to material or schedule changes when necessary. New business opportunities for both Pentair and our Suppliers depend on our ability to quickly meet customers' delivery requirements. Suppliers must continually remove waste from the delivery flow through electronic data interchange (EDI), engineering support, Vendor Managed Inventory (VMI), materials agreements, packaging improvements, etc.

3.4.1. Shipping Terms

Suppliers will be expected to ship under most recent revision of Incoterms. Our standard expectations are as follows:

- For domestic purchases → EXW for freight-collect and DAP for freight-prepaid terms.
- For international purchases → FCA for freight collect and CIP for freight-prepaid terms.

Site demands may vary. Suppliers should consult their Pentair buyer to determine appropriate terms.

3.4.2. Marine (Cargo Insurance)

The party responsible for paying the main transportation shall provide full cargo insurance coverage – defined as door-to-door, 'A' cover, all risk, marine, war, strike and riot – regardless of the shipping terms, with the exception of CFR/CPT Incoterms, in which insurance is the buyer's responsibility. Therefore, on E and F terms, plus CFR and CPT, the buyer shall provide full cargo insurance coverage, and on D terms, plus CIF and CIP, the seller shall provide full cargo insurance coverage.

For destinations and/or cargo on which governmental or insurance restrictions require additional approvals and/or premiums, or a split in coverage other than house-to-house, the responsible party/parties shall take such additional measures to ensure that the shipment is appropriately covered.

3.4.3 Labeling and Packaging Specifications

Suppliers shall package and mark all products in accordance with applicable drawings, specifications, purchase orders, and regulatory requirements. Suppliers must advise and work with the appropriate Pentair contact to understand packaging and labeling requirements. All products shall be shipped in packaging that provides adequate

protection during shipment and storage. Pallets should be clean and in quality shape without protruding nails, wood, dirt, etc. Containers on pallets shall not overhang edge of pallet. Packing peanuts and similar types of loose fill material are strictly prohibited. Barcode labeling, if required, must be applied in a readily accessible and visible spot on the container. The barcode label must be free of smudge marks, grease, and other markings or materials that can prevent Pentair from properly scanning the label.

All shipments to Pentair shall include the following:

- Packing slip including part number, part revision, part description, Harmonized Tariff Schedule (HTS) number, PO number, PO Line number, ship quantity, number of containers, ship from and to address, shipment date, Supplier lot number, Supplier name, and note if parts are for PPAP, engineering parts, or parts made after a corrective action change.
- Each part number shall be packaged and identified separately
- Each container shall be marked with the order number, quantity, part number, and revision of the contents so that it is visible from the outside of the packaging
- Certifications/Material Test reports as required (Material, Plating, Hardness, etc.)

3.5 Total Cost of Ownership

Pentair's supply base must be cost competitive on a global basis. Suppliers are expected to offset inflation costs through internal productivity improvements. Suppliers are required to participate in joint cost improvement efforts and demonstrate that they are working aggressively to eliminate waste in their operations. Suppliers must work with Pentair during the product design phase to meet Pentair cost goals and schedules.

3.5.1 Cash Flow

Pentair focuses on improving cash flow through lean enterprise activities. Lean activities include but are not limited to inventory optimizations, lead time reduction, local warehousing, localization of certain raw material, and pull signals for material movement.

3.5.2 Request For Quote Practices

Suppliers must carefully review Pentair drawings and related specifications to ensure they understand and can meet all requirements. If clarification of requirements is needed, contact Pentair before submitting a quote, building tooling, or producing samples or production parts. In no case shall drawings or specifications be superseded by informal agreements. All production part issues that are not covered on the existing drawings or specifications shall be communicated by Pentair through a purchase order, a revised drawing, or a Pentair approved deviation. All development part design agreements between the Supplier and Pentair will be documented by Pentair. No verbal agreements will be accepted.

3.6. Order Process and Invoicing

3.6.1 Purchase Order Types

Purchase orders may be presented in the form of traditional PO, pull signal, Vendor Managed Inventory (VMI), etc. and will be initiated by Pentair's authorized buyers. The part number and revision number of the purchased material or service will be presented on the purchase order. Purchase prices are subject to the latest acknowledged quotation or the mutually agreed Supplier Agreement.

3.6.2 Supplier Purchasing

Pentair requires visibility to subcontract operations of Suppliers. Pentair will make a determination, based on the type of subcontract operation, if such a subcontract may be used and if formal evaluation/approval is required.

The primary Supplier (Supplier to which the P.O. is granted) shall be responsible for:

- Communicating Pentair product specifications;
- Providing final product to Pentair's product specifications;
- Addressing quality issues for subcontract and finished product (includes verification of effective process);
- Maintaining copies of all subcontracted secondary process certifications, including but not limited to plating, annealing, cleaning, polishing, testing, and inspection;
- Ensuring subcontractor compliance with confidentiality and intellectual property requirements and with this Guide.

3.6.3 Invoicing

Invoices submitted to Pentair for payment should be clearly printed and include all necessary information required for prompt processing and payment. Invoice details should include all information specified by the Pentair company purchasing the product. Any applicable taxes and shipping/handling fees should also be clearly indicated on invoice documents as well.

3.6.4 Payment Terms

Pentair Standard Payment Terms are 2% 30, Net 90 for direct material suppliers and 2% 20, Net 60 for indirect material or services suppliers.

4 Supplier Evaluation, Approval, and Review

4.1. Supplier Evaluation and Approval

At Pentair, we follow an open quoting process that allows all companies, regardless of nationality, size, and experience, the same chance to offer us their products and services. Our Suppliers are selected based on their capability, quality assurance, delivery, customer service, total cost of ownership, design & development, manufacturing, strict adherence to ethics and legal compliance, and ongoing business management and communication.

A candidate Supplier needs to pass an initial assessment in the above capabilities. This assessment can be conducted through self-evaluation or an onsite assessment may be performed by Pentair staff. Pentair suppliers are expected to facilitate any requested assessment. Pentair prefers Suppliers who are ISO/TS certified.

After being qualified as a Pentair Approved Supplier, a company will have the opportunity to participate in the quoting of specific projects. The awarding will depend on not only the quoted prices, but the analysis of total cost of ownership.

From time to time, Pentair will initiate source changes in support of business needs, including improved quality, reduced lead-time, technical capability, Supplier

consolidation, global presence and cost. Source changes are typically preceded by a bid event and pre-qualification activities. Following the quoting, Pentair will evaluate the supply chain security, quality system, and business practices of the bidding Suppliers. Supplier evaluation is completed prior to awarding business to ensure that Suppliers have the appropriate foundation elements in place (ex: quality management system, procedures, organization) to consistently meet our requirements.

4.2. Audits / Assessments

Pentair reserves the right to audit Supplier facilities, processes, components, materials and finished goods. In addition, Pentair has the unqualified right to verify that product conforms to specified requirements. These same rights shall be extended to all Supplier subcontractors that provide material/components which go into Pentair products. As a Supplier's organization or process changes, Pentair must be notified to determine if an onsite assessment is needed.

4.3. Supplier Performance

Pentair will monitor Supplier performance on a regular basis and periodically provide performance reports to Suppliers. The level of monitoring depends on which of the below three categories the Supplier belongs to.

Approved Suppliers: Suppliers that have been evaluated, are approved for production, and have been added to the local MRP business system. If an adverse trend in performance is detected, actions will be taken to review the Supplier's status. If warranted, Pentair may initiate corrective action activities, including CAR, on-site audit, or re-qualification of samples and process documentation.

Preferred Suppliers: Designated as a smaller subset of the approved Supplier list and are Suppliers that are considered the 'go to' Suppliers for Pentair. These Suppliers may receive performance reports.

Strategic Suppliers: Designated as a subset of the preferred Supplier list and consist of Suppliers who are considered strategic to the business and Pentair has developed a partnership with. These Suppliers may receive performance reports as well as detailed quarterly Scorecards.

4.3.1 Scorecards

Pentair uses data to better understand performance and drive improvement. We measure our performance at each of our manufacturing locations based on our SQDCC metrics:

- Safety – Incident Frequency Rate, Lost Time
- Quality – Parts Per Million Defects, Total Cost of Quality
- Delivery – On Time Delivery
- Cost – Total Cost of Ownership
- Cash – Days on Hand inventory, Days Payable Outstanding, Terms

Because Suppliers play such a critical part in Pentair's success in each of these areas, we have developed a balanced supplier scorecard which includes our SQDCC metrics.

Suppliers designated as Strategic Suppliers by Pentair may be given a balanced Scorecard each quarter detailing their performance. Supplier Scorecard performance is

rated on quality, delivery, lead time, total cost of ownership, and risk. A rating of 100 is the goal. Below details how each section of the Scorecard is calculated:

Quality Metric: Parts Per Million (PPM) is calculated in the following manner: (Total Nonconformance Quantity / Total Receipt Quantity) * 1,000,000. PPM defective is based on the information from each business unit location.

Delivery and Support Metrics: Delivery performance is calculated as a percentage of purchase order lines received on time divided by total purchase order lines received. This information is pulled from each business unit location.

Cost Metric: Supplier's cost reduction is calculated by Net Economic Purchase Price Variance. That difference is represented as a percentage. Suppliers are also scored on whether they meet Pentair payment terms.

Risk and Compliance Metric: Suppliers are also rated on their risk to Pentair. Among other things, Pentair will consider Dun and Bradstreet reports here.

NOTE: There may always be differences in how Pentair business units score Suppliers.

5.0. Production Part Approval Process

Prior to placing the first production order for parts or services, Pentair may require the Supplier to submit samples and inspection documentation per the Production Part Approval Process (PPAP). The purpose of the PPAP is to ensure that the Supplier understands and can meet Pentair's requirements. The following changes require completion of a PPAP:

- New Supplier or sub supplier
- New part number by existing or new Supplier
- New or revised tooling
- Supplier material, equipment, or process change
- New production location

Pentair may require Suppliers or parts that have been inactive for more than one year (ex: no receipts of a specific part number within a 12 month period) to be re-qualified before a new order is placed. If re-qualification is required, Suppliers may be asked to provide updated company information and/or evaluation samples and documentation.

Suppliers must maintain on file all PPAP documentation for the life of the product or a minimum of three years from the PPAP completion date unless otherwise stated. This documentation should be made available for Pentair upon request.

Annual Part Recertification

To prevent quality degradation, an annual re-certification may be required for critical parts, as defined by Pentair engineering. Related costs are the Supplier's responsibility. At a minimum, this recertification will include:

- Part Submission Warrant (PSW)
- 3-piece full dimensional layout
- Current revision print
- Material certification (Must specify if required standards are met)

- Functional test results, if applicable

Pentair will notify Suppliers of parts that require recertification and will communicate the specific requirements.

5.1 PPAP Levels

Pentair will select the required submission level based on the type of part and the presence of critical characteristics. The required elements will be communicated to the supplier via the Part Submission Warrant (PSW) in **Appendix C**. There are five different levels identified by Pentair. The levels are based on AIAG PPAP levels. (Automotive Industry Action Group)

NOTE: There may be differences in how Pentair business units approve production material.

LEVEL 1: Part Submission Warrant only

LEVEL 2: Part Submission Warrant with product samples and limited supporting data as specified by Pentair

LEVEL 3: Part Submission Warrant with product samples and complete supporting data as specified by Pentair

LEVEL 4: Part Submission Warrant and other requirements as defined by Pentair. Unlike AIAG, only what is requested by Pentair is required for Level 4.

LEVEL 5: Part Submission Warrant with product samples and complete supporting data which will be reviewed and verified at the Supplier site.

5.2 Submission Requirements

The following quality tools and submission requirements may be required as part of a PPAP. Pentair has developed templates for these submission requirements. Suppliers may use their own forms; however, all of the information requested on the templates shall be included.

5.2.1 First Article Samples and Inspection Results

PPAP samples, or First Articles (FA), may be requested by means of a purchase order. When FA samples are requested, they shall be appropriately identified as “First Article Samples” and packaged separately from production materials. First articles must be produced from production tooling unless otherwise specified on the purchase order. Suppliers may not submit samples if there are known non-conformances. Non-conforming samples may only be submitted if there is a documented advanced deviation from Pentair.

First articles must include a minimum of three pieces from each cavity or tool with 100% of the drawing dimensions measured and all drawing notes verified, with documented results. A Sample Inspection Report shall accompany the first article parts which are to be marked with sample numbers corresponding to the sample numbers on the inspection report. A copy of the drawing, marked with sequence numbers shall be submitted with the inspection report. Suppliers may use their own inspection template if it contains the same information as Pentair’s First Article Dimensional template in **Appendix D**. Suppliers are expected to submit all documented results in English unless otherwise specified by the end using business unit. Documents may also be requested to be sent electronically.

5.2.2 Process Control Plan

Suppliers are responsible for ensuring all items, regardless of their process sources (ex: sub-Supplier), meet Pentair's specifications. To prevent defective product from being delivered to Pentair, Suppliers shall establish and document process standards and control for all aspects of their manufacturing operations.

A Process Control Plan (PCP) is a written description summarizing the system used to control the quality of the parts produced and to ensure that all print characteristics and other requirements are met. They are maintained by Suppliers for the life of the production process and updated as changes are made. PCP's should be in place prior to production and be readily available to individuals responsible for the operation of the process. Suppliers may use their own PCP template if it contains the same information as Pentair's PCP, shown in **Appendix E**. A single control plan may apply to a group or family of products that are produced by the same process, material, and source. The PCP is not required for all but may be requested to be included in the PPAP submission package, detailing each step of the process. In the event process changes are expected to occur after the PPAP submission, a corrected version of the control plan should be communicated to Pentair.

5.2.3 Process Flow Diagram

The Process Flow Diagram (PFD) provides a visual understanding of the Supplier's part processing and control system. The PFD should provide a graphical representation of the activity being performed, a description of the operation, and inspection practices for all critical characteristics.

The PFD shall include the entire process flow starting with receiving inspection and ending with packaging and shipping, including handling of non-conforming material and sub-assemblies. It shall include any sub-tier or outside suppliers, along with the names of those suppliers. It shall also include machine numbers or unique identifiers that reflect what has been approved as part of the process. Suppliers shall also identify those operations linked to the manufacturing of features identified as critical characteristics.

The flow diagram is not required for all but may be requested to be included in the PPAP submission package. In the event process changes are expected to occur after the First Article submission, a corrected version of the planned process must be communicated to Pentair. An example PFD is shown in **Appendix F**.

5.2.4 Labeling and Packaging

Suppliers shall ship samples in packaging representative of packaging that will be used for production parts, unless otherwise specified. This is to verify the Suppliers understanding of Pentair's packaging requirements before full production begins.

5.2.5 Material Test Results

Some products may require additional testing and analysis beyond dimensional inspection to verify conformance. When applicable, the Supplier must provide all necessary material test results for products when performance or functional requirements are specified by Pentair. Examples include electrical testing, corrosion testing, chemical analysis, mechanical testing, x-ray testing, etc. When an outside service is used, the name of the company must be included in the submission.

The Supplier must also include a Restriction of Hazardous Substance (RoHS) certificate

of compliance in accordance with Directive 2009/95/EC for each PPAP submitted and reference the Pentair part number on the certificate.

5.2.6 Design and Process Failure Mode and Effects Analysis

A Design Failure Mode and Effects Analysis (DFMEA) is a structured method to identify ways in which a design might fail to meet the customer requirements. It also helps with identification and implementation of corrective actions to eliminate potential failures. Suppliers may be asked to engage early in the design process and participate in a DFMEA.

Similar to DFMEA, a Process Failure Mode and Effects Analysis (PFMEA) is a structured method to identify ways in which a process might fail to meet the customer requirements.

The PFMEA should follow the flow established in the Process Flow Diagram. Suppliers shall have a system to identify and report their highest Risk Priority Numbers (RPN) and they must be used on the PFMEA with action plans noted to address processes identified as high risk. Any quality issues will require updates to be made to the PFMEA with the updated portion submitted to Pentair with corrective action. Suppliers may reference Pentair's PFMEA example in **Appendix G**.

5.2.7 Gage Repeatability and Reproducibility

It is recommended that all measurement and test equipment that has been identified on a control plan be analyzed. This is to ensure that the amount of variation due to the measurement system is acceptable for the process characteristic it is intended to measure. Pentair may require Suppliers to conduct and submit Gage R&R studies for characteristics that are critical. This requirement can apply to both variable and attribute characteristics.

The employees who will be using the measuring instrument in production should be involved in the Gage R&R study. If the measurement system changes, the Supplier should perform a new gage R&R study.

The measurement system must be accepted by Pentair prior to being used for any capability studies or to accept or reject parts. If the measurement system fails to meet the Pentair's acceptance criteria, the Supplier shall take corrective action to improve it. If the Supplier needs to use a gage that does not meet the criteria for acceptance, Pentair must be contacted for approval prior to use.

5.2.8 Capability Study

Process Capability Studies may be required on certain Pentair critical characteristics. Critical characteristics will be defined by the Pentair business unit requesting the PPAP. These studies are used to determine the ability of a process to meet customer requirements. The Supplier's process must be in statistical control before beginning a capability study.

Capability studies shall consist of a Pentair defined minimum number of pieces and Suppliers should select samples for the study from the production run produced in sequence and identified. Specific requirements can be found in the Pentair PPAP instructions. Also, when possible, process capability studies shall be completed using variable measurement methods.

Suppliers should reassess process capability studies on a routine basis to ensure that the process mean has not shifted and that process variation has not increased.

- **Appendix**

APPENDIX A – Definition of Terms / Acronyms

APPENDIX B – Tooling Details Form

APPENDIX C – Part Submission Warrant

APPENDIX D – First Article Inspection Report

APPENDIX E – Process Control Plan

APPENDIX F – Process Flow Diagram

APPENDIX G – Process Failure Mode & Effects Analysis

APPENDIX H – Supplier Deviation/Change Request Form

APPENDIX A – Definition of Terms / Acronyms

AIAG	**-**	**Automotive Industry Action Group**
CAR	**-**	**Corrective Action Request**
COO	**-**	**Country of Origin**
DFMEA	**-**	**Design Failure Mode and Effects Analysis**
EDI	**-**	**Electronic Data Interchange**
ENS	**-**	**Entry Summary Declaration**
EU	**-**	**European Union**
GAGE R&R	**-**	**Gage Repeatability and Reproducibility**
HTS	**-**	**Harmonized Tariff Schedule**
ISF	**-**	**Importer Security Filing**
ISO	**-**	**International Organization for Standardization**
ITAR	**-**	**International Traffic in Arms Regulations**
NDA	**-**	**Non-Disclosure Agreement**
PIMS	**-**	**Pentair Integrated Management System**
PSW	**-**	**Part Submission Warrant**
PCP	**-**	**Process Control Plan**
PFD	**-**	**Process Flow Diagram**
PFMEA	**-**	**Process Failure Mode and Effects Analysis**
PMI	**-**	**Positive Material Identification**
PO	**-**	**Purchase Order**
PPAP	**-**	**Production Part Approval Process**
REACH	**-**	**Registration, Evaluation, Authorization & Restriction of Chemicals**
RFQ	**-**	**Request for Quote**
RoHS	**-**	**Restriction of Hazardous Substances**
RPN	**-**	**Risk Priority Number**
TCO	**-**	**Total Cost of Ownership**
U. S. CBP	**-**	**U.S. Customs and Border Protection**
VMI	**-**	**Vendor Managed Inventory**

APPENDIX B – Tooling Details Form

PENTAIR

TOOLING DETAILS

SUPPLIER INFORMATION

Tool Number: _____ *(Assigned by Pentair)*

Supplier Name: _____

Supplier Location: _____

Issue Date: _____

Part Number(s): _____ Part Revision: _____

Tool Ownership: ☐ Pentair ☐ Supplier ☐ Partial ☐ Other

Comments:

TOOL DESCRIPTION

General Description: _____

Tool Manufacturer: _____

Manufacturer Location: _____

Manufactured Date: _____

Price: ($) _____ Pentair PO#: _____

Lead Time: _____

Material: _____

Size: (HxWxD) _____

Number of Cavities: _____

Capacity per Shift: _____

Estimated Tool Life: _____

~Attach photograph of the tool to this form~

MAINTENANCE AGREEMENT

Inspection Frequency: _____

Inspection Conducted By: _____

Maintenance Requirements: _____

Other Information: _____

APPENDIX C – Part Submission Warrant

PENTAIR

Production Part Approval Process

(Part Submission Warrant and Checklist)

Supplier:	Address:	Supplier Code:	Commodity Code:
Part Number:	**Part Description:**	**Current Drwg. Rev. & Date:**	**PPAP Due Date:**

Reason for Submission (check all that apply):

- ☐ Initial Submission for a New Part or Process
- ☐ Engineering Change(s)
- ☐ Change to the Production Process
- ☐ Change to Optional Construction Method or Material
- ☐ Change to Part Supplier or Material Source
- ☐ Tooling: Transfer, Replacement, Refurbishment, or Addition
- ☐ Tooling Inactive Greater than 1 Year
- ☐ Regulatory Agency / Government Req.
- ☐ Correction of Discrepancy
- ☐ Parts Produced at an Additional Location
- ☐ Other: _____

Submission Information:

- ☐ Dimensional
- ☐ Material / Functional
- ☐ Appearance

Regulatory Info:

- ☐ NSF Listed ☐ WQA
- ☐ FAA product ☐ UL
- ☐ CSA ☐ CE:
- ☐ Other:

PPAP Level: **Submission Number:**

Part Approval Elements:

No.	Item	Actions Required / Comments or N/A	Person Responsible	Due Date	Completion Date
1	Design Records: Part / Component Detail Drawings, Assembly Drawings, etc.				
2	Engineering Change Documents				
3	Design FMEA				
4	Product Literature, Labeling, Agency Markings, Warnings, etc.				
5	Process Flow Diagrams				
6	Process FMEA				
7	Dimensional Results written on the part drawing or in table format				
8	Material, Performance Test Results, DVPR				
9	Appearance Approval Report				
10	Regulatory / Government Agency Review and Listing				
11	Production Control Plan				
12	Checking Aids - Fixtures, Models, Templates for testing or inspection				
13	Measurement System Variation Analysis (gage R&R, accuracy)				
14	Initial Process Capability Study on all key characteristics				
15	PPAP Warrant with Sample Product Submission				
16	Packaging and Shipping Specifications				
17	Tooling Details				

Declaration:

I hereby affirm that the samples represented by this warrant are representative of our parts, have been made on production tooling, and comply with all applicable requirements. Any deviations from this declaration are noted herein and on attached copies.

Authorized Supplier Name (print):	Authorized Supplier Signature:	Title:	Phone Number:	Date:
Disposition:	**Authorized Customer Signature:**	**Title:**	**Phone Number:**	**Date:**
☐ Approved ☐ Rejected ☐ Interim 60 Days				

NOTE:

PENTAIR

DIMENSIONAL RESULTS

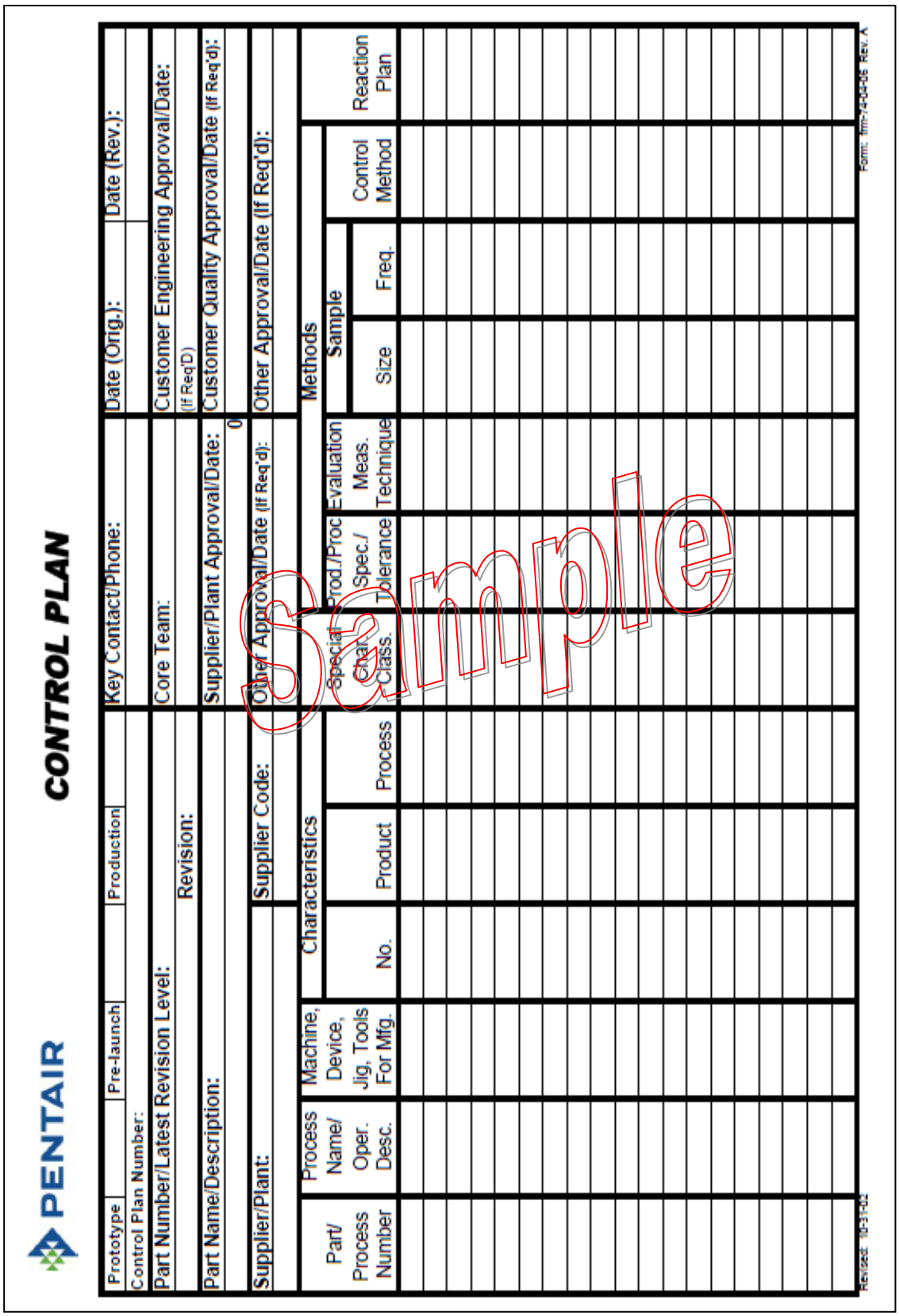
Supplier: | Inspection Facility: | Cav/Tool #:

Part Number: | Part Name: | Rev:

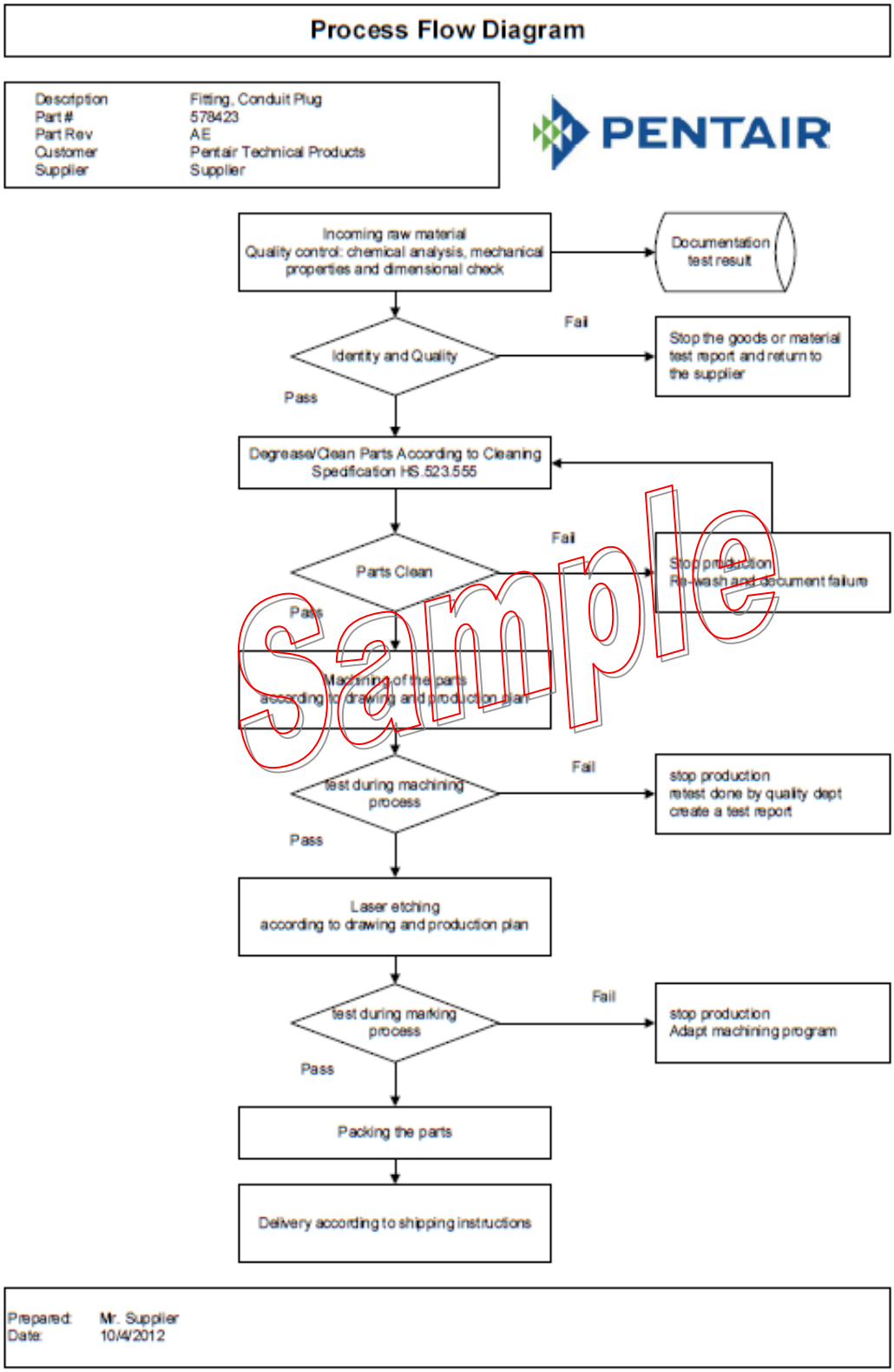
Item No	Dimension/Specification	Method of Check	Supplier Measurement Results 1	2	3	OK	NOT OK	Pentair Measurement Results 1	2	3	OK	NOT OK
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Supplier Inspected By: Date: PRF Inspected By: Date:

NOTE: All Dimensions are in Inches unless otherwise specified.


PENTAIR
CONTROL PLAN
Prototype
Pre-launch
Production
Control Plan Number:
Key Contact/Phone:
Date (Orig.):
Date (Rev.):
Part Number/Latest Revision Level:
Revision:
Core Team:
Customer Engineering Approval/Date:
(If Req'D)
Part Name/Description:
Supplier/Plant Approval/Date:
Customer Quality Approval/Date (If Req'd):
0
Supplier/Plant:
Supplier Code:
Other Approval/Date (If Req'd):
Other Approval/Date (If Req'd):
Part/ Process Number
Process Name/ Oper. Desc.
Machine, Device, Jig, Tools For Mfg.
Characteristics
No.
Product
Process
Special Char. Class.
Methods
Prod./Proc Spec./ Tolerance
Evaluation Meas. Technique
Sample
Size
Freq.
Control Method
Reaction Plan
Sample
Revised: 10-31-02
Form: frm-1404-06 Rev: A

APPENDIX F – Process Flow Diagram



APPENDIX G – Process Failure Mode & Effects Analysis

PENTAIR

PROCESS FMEA

PAGE 1 OF

Part or Process Name/No.	
Design/Manufacturing Responsibility	
Other Areas Involved	
Suppliers and Plants Affected	
Model	

FMEA Date (Orig.) ______

FMEA Revision: ______

Prepared By

Action Results

Item Description	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Potential Cause(s) of Failure	Occurrenc	Current Controls	Detection	R.P.N.	Recommended Action(s)	Area/Individual Responsible & Date Complete	Action(s) Taken	Severity	Occurrenc	Detection	R.P.N.
			2		7		3	42				2	7	2	28
								0							0
								0							0
								0							0
								0							0
								0							0
								0							0
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								0							0
								0							0

Supplier Deviation / Change Request Form

To Be Completed By Supplier	
Supplier Name: Click here to enter text. **Supplier ID #:** Click here to enter text. **Supplier Contact:** Click here to enter text. **Title:** Click here to enter text. **Email:** Click here to enter text. **Phone #:** Click here to enter text.	**Date of Request:** Click here to enter text. **Part Number:** Click here to enter text. **Part Description:** Click here to enter text. **Drawing Revision Level:** Click here to enter text. **Purchase Order:** Click here to enter text.
Type of Request: ☐ Deviation from original specification ☐ Material or specification change ☐ Tooling or equipment move ☐ Process change ☐ New or additional supplier	**Request Duration:** ☐ **Permanent** *Effective Date:* Click here to enter text. ☐ **Temporary** *Expiration Date:* Click here to enter text.
Detailed Description of Change or Deviation: Click here to enter text.	
Reason for Deviation Request: Click here to enter text.	
Action Plan to eliminate Root Cause: Click here to enter text.	

To Be Completed By Pentair				
Disposition:	☐ Approved	☐ Rejected	PPAP Required: ☐ Yes	☐ No
Additional Information Required: Click here to enter text.				

Signatures Required	
Engineering: Click here to enter text.	**Date:** Click here to enter text.
Quality: Click here to enter text.	**Date:** Click here to enter text.
Supply Chain: Click here to enter text.	**Date:** Click here to enter text.

All prior editions of this guide are obsolete and should not be used. Printed copies of this document are for reference only and should be marked so. Suppliers should obtain and use the current revision of this document available on the Pentair Supplier Information Website.

The master copy of this document is controlled and maintained by the Supply Management Group at Pentair Corporate in Golden Valley, MN. Any changes must be approved by and coordinated through the Manager of Supplier Development.

Revision	Date	Content
A	10/04/2011	Initial Release
A.1	10/04/2012	Pentair Company Update
B	12/31/2013	Pentair Company Update
B.1	12/05/2014	Affirmative Action Efforts
C	10/12/2015	Pentair Company Update

Contact Information

For information or questions regarding this Guide, Suppliers may send correspondence to:

Manager, Supplier Development
Pentair
5500 Wayzata Blvd.
Suite 800
Minneapolis, MN 55416-1261