Supplier Qualification and Development Guidelines

2021

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Introduction

Welcome to Lennox International Inc. (LII), one of the world's largest manufacturers of heating, cooling, and refrigeration systems (HVACR). We have achieved our global leadership role in supplying quality products by partnering with qualified suppliers who provide quality components and services.

PURPOSE

This document provides guidance and direction to LII suppliers to help them understand LII's expectations.

SCOPE

The document is to inform our strategic supplier partners of the expectations to be met or exceeded when providing quality products, components, assemblies and services, and the procedures to follow to maintain a successful long-term business relationship with LII. It is essential all suppliers comply with these Guidelines. These Guidelines supplement, and shall be considered to be incorporated into, any purchase agreement and/or terms and conditions of sale or purchase between LII (or any LII subsidiary) and its suppliers and suppliers, by their continuing to provide components, assemblies, other goods or services, shall be considered to represent to LII and the LII subsidiaries that the suppliers are in compliance with these Guidelines. If you have any questions regarding these Guidelines, please direct them to LII Supplier Development or LII Sourcing personnel.

OBJECTIVES

LII's goal is to achieve collaboration with world-class suppliers to build world-class quality products, at the lowest total cost, to the mutual benefit of LII and our suppliers.

LII sets the highest standards for quality and reliability for its products and services. To meet these standards, LII must have best-in-class suppliers performing as true partners. These partnerships will ensure our suppliers' early involvement in technology development and coordination of supplier selection decisions. Both LII and their strategic supplier partners will be rewarded by maintaining a continuous improvement focus throughout the life-cycle of our products and services through the mutual application of global supply chain management processes. We look forward to our strategic supplier partners' on-going support of LII's business units' needs for quality components and services.

LII recognizes strategic supplier partners as valued and integral contributors toward our long-term success. We are committed to providing our suppliers with technical resources, leveraging global resources and strengths to assist suppliers in areas such as continuous process improvement, lean manufacturing, and quality management. Through their participation in the supplier development process, our strategic supplier partners will share in LII's R&D and technology capabilities as appropriate, fostering development and enabling achievement of a sustainable competitive advantage.

LII contributes to strategic supplier development by customizing development plans, sharing resources and technologies, exchanging best practices, and monitoring performance. LII's structured approach to supplier qualification, performance requirements, performance assessment, and performance monitoring enables mutual long-term success for LII and our suppliers.

LII's Supplier Qualification and Development Guidelines are designed to:

- establish mutually beneficial long-term supplier relationships
- significantly reduce internal and external failure costs
- ensure the continuous flow of defect-free material to all LII business units' locations
- permit suppliers to ship to LII's point-of-use without the need for receiving inspection
- reduce inventories through effective communication of LII's purchased material demand
- ensure on-time delivery of purchased material
- ensure effective communication with suppliers and a thorough understanding of product requirements
- establish a growing list of LII "Preferred Suppliers"

- reduce material review and handling costs
- reduce quality and manufacturing costs attributed to a defective part's impact upon LII production lines
- support manufacturing with the right part, at the right time, at the right quality and reliability, and at a fair cost
- improve profitability through waste reduction and effective resource management
- reduce injury risks

BENEFITS

Benefits achieved by suppliers by participating in LII's program include:

- increased potential for market share growth
- preservation of strategic supplier partners' margins, while lowering overall cost of production
- achieving "Preferred Supplier" status when LII seeks new business supplier partners
- realization of cost benefits from continuous process and product quality improvement, lean manufacturing, and quality management
- effective communication with LII to ensure a thorough understanding of LII's component, assembly or service requirements to support manufacturing with the right part, at the right time, at the right quality and reliability, and at a fair cost
- continual flow of defect-free material, minimizing the number of returns
- reduced inventories through increased visibility to LII's product demands
- improved profitability through waste elimination and effective resource management
- reduced injury risks for both supplier and LII

LII's supplier qualification and development process is designed to be a cooperative relationship between LII and its strategic supplier partners to ensure and maintain excellent quality, reliability, and on-time product deliveries throughout the product life-cycle, at an appropriate cost. These objectives are achieved by LII and our strategic suppliers partnering together to develop and maintain controlled processes fully addressing LII's requirements while minimizing quality costs for both partners. Nothing in these Guidelines may be construed or interpreted by any supplier as a promise, commitment or award by LII (or any LII subsidiary) for any business.

Supplier Qualification Process

LII has established a controlled process to evaluate and qualify suppliers to ensure their capability to supply components or services to LII. Upon successful completion of the evaluation and qualification process, the supplier may be added to LII's Qualified Supplier List. Supplier qualification is location-specific; subsequent or alternate manufacturing locations of the same company must be qualified before they may be granted Qualified Supplier status. Suppliers, once qualified, shall be considered to represent to LII and Lennox subsidiaries, that the information and items they provided in the evaluation and qualification process remains accurate and complete, that the supplier is in compliance with the evaluation and qualification process and would remain qualified and that the information supplier provided LII in the evaluation and qualification process has not changed, unless LII has received written notice of such changes from a supplier.

To be considered for Qualified Supplier status, suppliers must:

- have an established quality system, which at a minimum complies with the requirements of ISO 9001:2015, and provide a copy of their quality systems manual to LII, if available.
- complete a LII supplier audit self-evaluation, and forward the results to LII
- achieve an acceptable result from LII qualification assessments, performed by LII at the supplier location
- ensure confidentiality of LII proprietary information
- at the option of LII, participate in a "Joint Operations Review" typically conducted at LII's facility
- participate and successfully complete the Production Part Approval Process (PPAP) with LII
- upon LII's request, provide first-article or pre-production evaluation units
- actively participate in the LII supplier development process.
- agree to participate in LII's injury risk reduction process, as it relates to safety and ergonomics of purchased materials.
- Agree to counterfeit part and material preventive action.

Upon request, a potential supplier's proposed variations to qualification for Qualified Supplier status may be reviewed and may be accepted by LII, providing such variations meet or exceed the quality system elements and objectives established by the supplier qualification process.

QUALITY SYSTEM

An effective, reliable, and efficient quality system is based on the integration of quality development, improvement maintenance and management activities. At a minimum, the supplier's quality system must comply to the requirements of ISO 9001:2015. Suppliers are required to establish, document, implement, maintain, and monitor their quality management system to continually improve its effectiveness in accordance with the requirements of these Guidelines, and to provide a copy of their quality manual, if available, to LII.

If there is no quality manual an acceptable substitution is documented scope of your QMS, a list of exclusions (to the ISO standard), if there are any exclusions, and justifications for the exclusions, process interactions (business wide flowchart) and a list of all QMS procedures.

Suppliers are encouraged and may be required to obtain third-party evaluation and certification of their quality system. When certification is required, the supplier must keep LII informed of the supplier's certification status and must provide LII (or a LII subsidiary) with copies of the certification and any related documents on request. LII requires up-to-date copies of any and all applicable third-party certifications achieved by our suppliers. If a supplier's quality system registration or certification status changes or is suspended, the supplier must notify LII within five (5) business days of such change.

SELF-EVALUATION

Prior to LII performing an initial official assessment or audit, suppliers may be requested to conduct a self-assessment of their operations and quality system, completing the Supplier Qualification and Development Assessment Survey forms provided by LII. Upon receipt of the completed Supplier Qualification and Development Assessment Survey forms and a copy of the supplier's quality system manual (if available – see page 3), LII supplier development engineering will perform a pre-assessment review. Also, LII will provide the Supplier Qualification and Development Assessment Survey forms upon supplier's request. The supplier is expected to be readibly able to show objective evidence for the survey scores chosen.

During the self-evaluation period, LII supplier development engineering may be available to answer questions regarding qualification criteria, or to provide technical assistance to suppliers to adjust or improve their process(es).

QUALIFICATION ASSESSMENTS

Initial and periodic official qualification assessments are planned, scheduled and conducted at the supplier's manufacturing facilities by LII sourcing and supplier development engineering representatives. The initial qualification assessments evaluates the capability and risk of the supplier's operations to meet LII's production phase performance expectations for product cost, quality, safety, ergonomics, and delivery. LII may require follow up or surveillance audits to evaluate the supplier's:

- continued production capability
- performance on corrective actions
- quality system effectiveness, status and improvements
- performance capability concerns targeted for improvement
- continuous improvement plans and quality process control planning
- design and processes, including FMEA, to determine the extent of control needed by LII
- product related safety and ergonomic risk assessment capability

At the discretion of Supplier Development management qualified suppliers, having demonstrated long term successful performance, may be requested to complete a self-assessment, instead of an LII required on-site visit.

CONFIDENTIALITY

Suppliers and their associated supply chain must ensure the confidentiality of customer-contracted products, projects under development, and related product information. Prior to LII discussing or providing suppliers with any specifications, technical support, or LII proprietary information, suppliers must complete a non-disclosure agreement (NDA). In the event a NDA is not signed, suppliers shall be deemed to represent that they will keep all information provided by LII or a LII subsidiary confidential and will not share such information with any third party.

JOINT OPERATIONS REVIEW

When requested by LII, suppliers are expected to participate in a one-day operations review conducted either at LII, supplier's location or by teleconference. This review is structured to facilitate suppliers' comprehensive understanding of LII's manufacturing, quality, and delivery requirements prior to suppliers' production start-up. At a minimum, supplier representatives should include members from quality assurance and operations.

The Joint Operations Review agenda typically includes:

- a plant tour and demonstration of production capabilities and process controls.
- an overview suppliers' improvement goals and recent performance relating to quality, delivery, cost effectiveness, lead-time reduction, safety, ergonomics, and environmental.
- Supplier Quality Review: PPM, warranty, and SCAR performance and action plans.
- a review of the evaluation results of first article or initial production units, if units manufactured prior to review, and discuss any product specification change requests.

- clarification of product quality key characteristics, including finish standards, and associated acceptable quality levels.
- discussion of the production part approval process (PPAP) and LII's expectations for supplier to provide information and inspection data from the application of the PPAP.
- review of the supplier's process control flowchart, supplier's measurement systems and proposed methods of part measurement and acceptance sampling plans.
- review of purchase order delivery requirements, schedules, and shipping requirements.
- review of incoming inspection procedures, RMA process, and supplier rating system.
- discussion of LII expectations for configuration management practices, document interpretation, and process for submitting change requests.

Through suppliers' participation in reviews, LII and suppliers are able to collaboratively plan for product realization and to prevent problems during qualification and production builds.

FIRST ARTICLE / PRE-PRODUCTION UNITS

Suppliers may be requested to furnish product examples to demonstrate the supplier's capability to manufacture product meeting LII's specifications. LII will provide specifications and technical assistance to suppliers upon request in order to facilitate suppliers' understanding of LII's performance expectations, specifications, and key product characteristics.

Parts must be production-equivalent for qualification builds, and must be produced using production tooling in a version controlled production process. Suppliers will be deemed to represent to LII and LII subsidiaries that any and all parts or products provided to LII will fully conform to those provided by supplier as first article/pre-production/qualification units. If there are process and / or material changes needed after LII's initial approval, the supplier must submit a change request on form SD1001 and receive approval prior to implementing any changes. Suppliers are expected to follow the PPAP methodology, which is discussed later in these Guidelines and further described within Appendix A.

DOCUMENT CONTROL, CONFIGURATION MANAGEMENT AND CHANGE CONTROL

Suppliers must have a document control system capable of assuring positive control of documents, and their usage. Personnel using documents under the supplier's direction must have ready access to the correct documents to perform their tasks. Suppliers must assure their sub-tier suppliers and contractors have documents that are necessary and sufficient to perform their tasks.

Documented revisions must be controlled by the supplier's configuration management system to assure LII purchase orders are entered, planned, built, tested and inspected to the correct documentation. Obsolete documents must be destroyed, or appropriately identified as such for limited distribution, and to prevent their unintended use.

LII documents are intended to be complete and self-explanatory. Questions and clarifications regarding document content, change effectivity, etc. should be directed to LII supplier development personnel.

Documents the supplier believes need revision should be discussed with LII. If appropriate, the supplier should submit a written change request to LII at least sixty (60) days prior to the need for incorporating the change. Submit all requests to LII Sourcing, Engineering and Supplier Development personnel using the LII Supplier Engineering Change Request form, SD-1001. Drawings or specifications may not be changed by the supplier without the prior written approval of LII.

Supplier Development Process/Process Development

LII contributes to strategic supplier development by enabling and supporting continual improvement, through practices such as the production part approval process (PPAP), value engineering and lean manufacturing, utilizing tools as design of experiment (DOE), design and process failure modes and effects analysis (DFMEA / PFMEA), customizing product and process development plans, sharing resources and technologies, exchanging best practices, and by monitoring supplier performance.

Continual improvement is a requirement of LII's partnership with suppliers. LII works in concert with the supplier to identify significant projects for improvement, committing to our partners to provide resources to improve operations where mutually beneficial. To achieve these goals, LII collaborates with supplier partners to use the noted quality tools and processes described below.

VALUE ENGINEERING

Suppliers are required to participate in the LII Cost Reduction Program. Technical knowledge and industrial expertise place suppliers at the competitive forefront by reducing material, manufacturing, and handling costs while improving quality and reliability, through process optimization techniques. Suppliers are encouraged to recommend improvements for new and existing product designs, and to make suggestions for improved methods for material packaging, handling, and delivery.

CONTINUOUS FLOW MANUFACTURING (DEMAND FLOW / LEAN MFG)

Continuous flow manufacturing processes place emphasis on increasing value-added activities while eliminating non-value-added activities. LII strongly encourages suppliers to adopt lean manufacturing methods, with the objective of increased throughput, reduced inventories, increased inventory turns and reduced non-conformance costs.

DESIGN OF EXPERIMENTS (DOE)

Industrial designed experiments are a cost effective method, employing controlled tests and applying statistics to the analysis of data, to evaluate the effect of variation upon key characteristics.

Key characteristics are those product or process parameters for which variation is likely to significantly affect the product such as fit, form, function, performance, reliability, or appearance. The use of this tool will guide suppliers' decisions to implement process controls. LII encourages and supports suppliers' use of DOE and other statistical tools to optimize their processes.

ROBUST DESIGN

Products and processes, relatively insensitive to normal variations, that continue to produce consistent, acceptable results are said to be "robust." Designed experimental techniques, such as Taguchi designs, can be used to measure and improve the robustness of products and processes. LII encourages suppliers to develop and implement robust designs in their processes and encourages suggestions for improving the robustness of LII parts, assemblies and products.

PROCESS CONTROL PLAN

Process control plans provide an effective way for suppliers and LII to achieve consensus on quality planning for new products, provide increased confidence of supplier process control and provide a basis for review of subsequent system changes.

Suppliers are to develop and submit process control plans which describe the quality planning for a specific part, or family of parts, covering all key characteristics specified by LII drawings. Plans are to include, but are not limited to, all of the facility's associated manufacturing processes and the identification of any processes requiring validation, including all sub-contracted processes for materials and services. Process control plans are to be submitted to LII supplier development engineering for review and approval. Control plans are a PPAP element.

The plans are to be maintained to reflect the incorporation of process changes authorized by LII, and plan revisions are to be submitted to LII for approval. Process control plans may not be changed without written agreement and approval from both the supplier and LII.

Proprietary process details included on the plan should be identified as such. Suppliers may reserve the right to maintain plans containing proprietary process details at their facility, subject to on-site review by LII.

PROCESS VALIDATION

Suppliers must validate any production or service process where the process's output cannot be verified by subsequent monitoring or measurement, or as directed by LII. This includes any processes where deficiencies may become apparent only after the product is in use, or after the service has been delivered. Processes such as welding or bonding are examples of processes to be considered for validation. Validation must demonstrate the ability of the processes to consistently achieve planned results. Suppliers may refer to the process validation requirements listed in ISO 9001-2015 for guidance.

PRODUCT CONTROL PLAN

Product control plans serve to document those product parameters deemed necessary to control the quality of material or services supplied to LII. Suppliers are to prepare, maintain, and follow a product control plan. The plan addresses dimensions, specifications, and certifications and includes all designated key characteristics identified by LII drawings and specifications, and records the methodologies employed to monitor their performance and maintain a state of control over the production activity.

FAILURE MODE AND EFFECTS ANALYSIS (DFMEA / PFMEA)

FMEA is a disciplined approach to identify potential modes of failure, analyze the effects of these failures, and document the potential causes of failure. Prior to production start-up, suppliers are expected to use DFMEA / PFMEA techniques to evaluate their designs and processes, and to identify and reduce potential failure modes (causes). The FMEA's serve as the basis for developing and evaluating the results of the supplier's corrective and preventive actions.

Suppliers must evaluate the frequency of occurrence, severity, and detectability of the failure, applying a 1 to 10 (10 is worst-case) rating to each of the three categories. The risk priority number (RPN) is the product of the ratings of frequency of occurrence, severity, and detectability, and will range from 1 to 1000. Failure modes with the highest severities and RPNs must be evaluated and mitigated until they reach an acceptable level of risk to the organization. After deploying the corrective actions, the supplier must maintain the FMEA by re-evaluating and documenting the impact of the corrections on that failure mode's RPN.

FMEAs are live documents requiring updates when on-going production corrective/preventive actions are requested.

QUALITY FUNCTION DEPLOYMENT (QFD)

QFD is a method of translating customer requirements into appropriate internal company requirements at each product development phase: research and development, engineering, process design, manufacturing, and distribution. LII uses and promotes this approach and encourages suppliers to ensure our requirements are understood so we can work together to meet them.

Suppliers are required to identify the processes needed for the quality management system and its application throughout the organization, and the sequence and interaction of these processes.

Further, suppliers are expected to determine the criteria and methods needed to ensure both the operation and control of these processes is effective, ensuring the availability of resources and information necessary to support the operation and monitoring of these processes.

When products and the processes that produce them are designed as complementary systems, the systems will more effectively produce better overall results. LII prefers to work with its suppliers as business partners to maximize the benefits of concurrent engineering to both LII and to the supplier.

PROCESS POTENTIAL STUDIES

Process potential studies are performed to assess the short-term influence of the process upon key characteristics of the product. Effects resulting from variation of the machine, the operator, the process and the environment are evaluated by the process potential study. When conducting process potential studies, suppliers will assess the process' output by evaluating measurement data from product manufactured using that process. Preferably more than 80 (30 minimum) consecutively produced products are evaluated, and the data from the evaluation are used to calculate the capability indexes. The process must be statistically stable and in control. Minimum process capability indexes, Cpk > 1.33 and Cp > 1.5 are required to consider a process statistically capable. Additionally, other minimum capability requirements may be identified on part drawings.

Initial Process Studies calculated results are a PPAP evidential required when measureable critical features are identified on part drawings.

Reliability Strategy & Requirements

RELIABILITY GOALS

Supplier is responsible for demonstrating that the reliability targets of the subsystem or component meet the specified reliability requirements. In the event that of no specific requirements are provided, the default device reliability target shall be greater than 99.7% in the first year of service and 98.5% in 10 years of service as measured by the Lennox International warranty claims system.

The supplier shall collaborate with LII engineering teams in developing a plan that demonstrates that the specified reliability targets will be achieved.

a) The supplier shall understand design and reliability requirements of Lennox's products so that a comprehensive design and reliability specifications can be established
b) The supplier shall structure and follow a series of engineering activities so that the resulting product satisfies Lennox's requirements and product needs with regard to product reliability.
c) The supplier shall include activities that adequately verify that Lennox's product reliability requirements and product needs have been satisfied

RELIABILITY RISK ASSESSMENT

Reliability risk assessment incorporates activities to identify potential failure modes and mechanism along with mitigation plan to remove or minimize those risks. FMEAs will be used to determine anticipated potential failure modes, effects and associated risk. FMEA at a minimum will be applicable to items within the scope of this program that are deemed high severity, high criticality, high RPN, NUD's (new, unique, or difficult) and failure mechanisms previously experienced by legacy components. The data used to perform risk assessment may be from historical, from previous testing of similar products or from the reported field failures of similar products.

The priority of risk reduction activities will be in the following order:

1. Severity of 8 or more (regardless the RPN values low or high)
2. Criticality with a Severity > 4 AND Occurrence > 3
3. RPN > 100

To assist in populating FMEAs with applicable failure modes, the supplier shall evaluate past ECNs, SCARs, obtain feedback from tech service, engineering, quality, internal/external tribal knowledge, etc., such the voice of the customer and previous corrective actions are incorporated into the design and or manufacturing processes for the component under evaluation.

In addition, the supplier shall evaluate field returned legacy components and understand what mechanisms drive failure modes, ultimately modeling when and how components fail as a function of the associated stresses. Examples of failure mechanisms include ductile fracture, Creep, Plastic deformation, fatigue, corrosion, fretting, wear, electro-migration, Contamination, Electrical stress, ESD, Removal of protective coatings, Delamination, UV degradation, etc.

After performing the necessary risk assessment using FMEAs (design, process, service, system etc.) or similar tools, supplier shall generate a Risk Matrix which will list all the anticipated risks according to the risk ranking (High, Medium and Low). In addition, supplier shall develop a Reliability Test Matrix with necessary information (such as sample size, test duration etc.) for better traceability.

RELIABILITY PROCESS AND PREDICTIONS

The supplier's reliability team must establish a clear path of voice of the customer (VOC) to critical features (CF), by use of QFD or a similar tool. CF must have a control plan and associated Cpk.

As corrective actions are developed for high risk failure modes, estimates of "fix effectiveness" for each improvement activity will be used to predict reliability by mode. System, sub-system and component reliability will be a "roll up" of individual fix efforts. Comparisons to target will be assessed at each DP stage gate.

DESIGN FOR RELIABILITY ANALYSIS

The supplier shall perform an analytical evaluation of mission critical failure mechanisms. Quantification of stress will allow the supplier to analytically determine component life via material properties, understanding if the stress is within the endurance limit of the material. If stress is found to be excessive, stress reduction corrective actions must be completed prior to initiating testing.
Supplier's engineering team shall collaborate with Lennox team to determine the appropriate tools to perform these activities. Some tools that are widely used are FEA (Finite element analysis, Stress-Strength analysis, De-rating for electronic components, Highly accelerated life test (HALT), Standard based reliability prediction etc.)

RELIABILITY TEST PLAN:

Based on the output of the design FMEA, anticipated risks, NUDs, application of the products etc., supplier shall develop a complete reliability test plan in coordination with Lennox team. Depending on the product and project requirements, these reliability test normally will fall under three categories that can be applied in selectively or in total as follows:

a) Reliability Screen test:
Supplier shall perform these tests at the very beginning of the product development phase if applicable specially in case of NPI. Such tests include Highly accelerated life test (HALT), Durability test etc. These are not statistical based test and shall be performed basically to verify the proof of design using engineering or prototype parts. The main goal is to identify the weakest point of the design so that supplier's design team get adequate time to resolve any design related issues ahead of time.

b) Reliability growth test (RGT):
If it is required based on project requirements, supplier shall perform reliability growth test to emulate real use condition of the products as close as possible. RGT doesn't have any pass-fail criteria. The purpose of this test is to identify the design weakness as early as possible by creating and executing various test scenarios at various stressed conditions and apply corrective actions to resolve any issues that may occur during test. Unlike reliability screen test, RGT shall be performed using matured products. At a minimum testing should involve FM with high severity, high criticality, high RPN, NUD's and FM previously experienced by legacy parts. The test plan shall include testing of the weakest component strengths (for a specific

failure mechanism) against the highest expected field stresses or when possible utilize accelerated life test (ALT) strategies via traditional, optimum or compromise ALT methodologies.

c) Reliability Demonstration Test:
Supplier shall perform reliability demonstration test to certify that the product has meet Lennox's reliability requirements as specified in reliability target requirements and specification for specific design life and Pass/Fail criteria. The life of the products could be defined in number of cycles or operation time (hrs.) or even with ON/OFF cycles whichever is appropriate. This is a statistical based test and the number of test samples and test time (duration) must be calculated based on anticipated failure life distribution of the product, acceleration factors (AF-if applicable), confidence bound (CI) and design life. The supplier's design/reliability team must coordinate with Lennox engineering team to finalize the test procedure and have a full alignment before performing this test.

In addition, the test plan shall include appropriate noise factors such as: piece to piece variation, changes over time, customer usage and duty cycle, environment, and system interaction.

DEMONSTRATE PROCESS CAPABILITY

- Repeat previous step with production intent tooling and processes.

EARLY LAUNCH CONTAINMENT (ELC)

Lennox has developed an Early Launch Containment (ELC) program to:

- Document the supplier's efforts to verify control of its processes during production start-up.
- Ensure that any quality issues that may arise are quickly identified, contained, and corrected.
- Increase involvement and visibility of top management to the quality issues pertaining to this product. Collect lessons learned for systemic improvements.

The component supplier may be required to provide a regular (weekly) quality update to LII management:

- Quantity produced and PPM. (Trend Chart)
- Pareto of defects both from field and manufacturing.
- Root cause analysis and corrective action plan to address failure modes.
- Report on any parts returned from Lennox manufacturing facilities and field returns. Validation of reject, root cause analysis, and corrective action.

ELC Exit Criteria:

- A minimum of 3 supplier production lots and four consecutive weeks of Lennox production with rejects < 200 PPM as seen from Lennox Supplier PPM and zero SCAR reports or
- Eight weeks from first LII production and a summary, which verifies that the normal production controls are effective for controlling all discrepancies identified in the Lennox Supplier PPM or SCAR reports. The time begins accumulating from the date of implementation of permanent corrective action.

All supporting documentation (FMEA, Control Plan, process flow diagram, operator's instructions, etc.) must be updated and submitted to support the corrective action efforts.

Component Qualification

PRODUCTION PART APPROVAL PROCESS (PPAP)

The PPAP is LII's method to approve components prior to production shipments, to determine "all engineering design and specification requirements are properly understood, and to confirm the supplier's manufacturing process has the potential to produce product consistently meeting these requirements during actual production at anticipated or actual production rates." PPAP may be required for all components and materials incorporated in the finished product, and may also be required if components are processed by external sub-contractors.

All suppliers' components and parts used in obtaining PPAP details submitted to LII for review must be randomly selected from production lot sizes. Pre-selecting or screening parts for submission to LII is not acceptable.

PPAP is a series of documents gathered in one specific location (electronically) called the "PPAP Package," typically including documents such as a FMEAs, process flow diagrams, Control Plans, inspection and capability data, appearance approval sheet, and warrant (PSW), to be completed (in English only) by the supplier, as well as sample parts submittal, prior to obtaining production part approval from LII. When taking data for the PPAP, the supplier must obtain data from the actual production process preferably performing at the production rate quoted to LII, and not from a special run.

The PPAP package will be maintained as an electronic record in a controlled computerized system via QRCT System (Reliance).

When providing PPAP data to LII, the supplier is expected to also provide (when requested):

- PPAP samples
- a certificate of compliance (C of C) or certificate of analysis (C of A) as specified by LII
- a data sheet recording all mechanical and electrical measurements taken by the supplier
- a raw material analysis / assay performed by an independent laboratory
- results from a capability study performed on all key characteristics indicated on LII's drawing (or as indicated in the PPAP / warrant)
- process and product control plans
- DFMEA and PFMEA results, including results of mitigation of high risk failure modes
- copies of statistical analysis and process control (SPC) charts or records of other statistical data used by the supplier for process capability and control
- a copy of a flow chart indicating the process flow of the components or assemblies manufactured by the supplier for LII
- pictures of product protecting shipping packaging material and labels
- pictures and samples of datamatrix labels
- deviation requests when parts don't completely meet all engineering design and specification requirements

LII may provide PPAP training to suppliers on a limited basis; however, each supplier is responsible for any detailed training of their personnel.

PPAP APPROVAL

The PPAP package is a series of documents to be formally approved by both the supplier and LII. The form that documents the approval of this package is either the signed Part Submission Warrant (PSW), or electronic approval in the QRCT System.

The approval of the PPAP Package indicates the supplier's responsible person has reviewed and authorized this package, and neither LII nor the supplier has identified any issues that would prevent its approval.

After LII has approved the PPAP, the supplier must provide written notification to LII of any changes to the product, suppliers, or manufacturing process that may impact fit, form, or function or reliability. Suppliers are required to obtain PPAP approval from LII whenever a new or modified component is introduced to production, or the manufacturing process is changed. Obtaining approval requires the supplier to provide sample parts, as requested, and documented evidence demonstrating:

- LII's requirements have been fully understood
- the product supplied meets those requirements
- the process (including sub-suppliers' processes) is capable of producing conforming product
- control plans and the quality management system will prevent non-conforming product from reaching LII and from compromising the safety and reliability of finished LII products

Final written or electronic PPAP approval is required for any production-level shipments to LII. The LII Supplier Development or Quality Engineer is authorized to approve a shipment of supplier material that will be used in products. Should a supplier have any question about proper authorization prior to final approval of PPAP submission, contact your LII Sourcing Manager or Supplier Development Engineer for clarification. This applies in all cases for saleable production materials, even in cases where purchase orders or releases have been received by a supplier.

PPAP approval is not required for engineering samples, pre-pilot parts, and other non-saleable product. In these cases, suppliers are responsible to ensure materials are within specification and that the responsible LII Sourcing Manager is fully aware and does not object to such shipments.

A listing and explanation of PPAP elements is contained within Appendix A.

When component reliability testing, application testing, LII manufacturing trials, and complete PPAP documentation confirms key product characteristics and specification requirements have been met, and the supplier and LII have approved the PPAP, the supplier's component will be "qualified."

Order Fulfillment

Suppliers are responsible for ensuring products or services meet established LII specifications. Audits, approvals, or other verification by LII of the supplier's quality system, process controls, acceptance activities, or any other activities do not absolve the supplier of the responsibility to provide acceptable product, nor will any such activities preclude the subsequent rejection of unacceptable product.

This section defines the general responsibilities for procurement relations between the supplier and LII. Specific additional responsibilities are defined in the applicable purchase agreement, terms and conditions and throughout these Guidelines.

REQUEST FOR QUOTATION (RFQ) / PURCHASE ORDERS

WWSC is the owner of all supplier contracts and that any/all changes have to be authorized and approved through WWSC. The LII buyer is solely vested with the authority to issue or to alter a purchase order, and on-line vendor requirements schedule (VRS). All communication on technical matters between the supplier and LII should be directed through the supplier development engineer. All suppliers' written communications must be in English, with all supplier change requests documented in writing. To be considered valid, LII change request approvals must be documented in writing.

All supplier quotations must include any additional costs, such as freight, duties, packaging, tooling, or other anticipated costs. LII's requests for quotation are not to be considered as offers to purchase. As a condition of conducting business with LII, supplier's quotations shall include material, labor, and overhead cost data for the parts or services being quoted to LII. LII reserves the right to verify and audit cost data.

Suppliers must contact LII for authorization and instructions prior to emailing data files over 10 megabytes in size. Larger files are best transmitted using the eSourcing portal or Hightail file sharing services.

Suppliers are encouraged to use LII's eSourcing system to communicate and complete RFQ's.

ELECTRONIC PURCHASE ORDERS AND INVOICING

It is LII's preference to use electronic data interchange (EDI) transmissions instead of standard hard copy business documents wherever possible.

When suppliers' systems permit this practice, LII shall initiate purchase orders by EDI to the supplier. The supplier shall generate a "functional acknowledgment" indicating purchase order receipt. The supplier shall be deemed to have accepted the order unless a purchase order rejection notice is communicated to LII within one (1) business day of the purchase order.

LII materials engineering or the local purchasing department is responsible for providing detailed training or refresher training to the supplier to ensure the supplier's personnel's knowledge and understanding of LII's electronic order processing system's requirements for use.

To ensure timely and consistent order payment practices, LII requires suppliers to ensure purchasing data contained on the invoice match the order data (purchase order number, price and quantity of parts shipped) and information contained on the purchase order. Invoicing errors may delay payment pending error correction and resolution.

UNDERSTANDING OF REQUIREMENTS

Product quality, cost, and delivery begin with a clear understanding of product specifications and purchase order requirements. LII promotes open lines of communication with suppliers and makes a concerted effort to thoroughly convey requirements. We also wish to remain in close and frequent contact with suppliers and to provide the appropriate level of technical assistance.

Suppliers are responsible to gain clarification from LII regarding any questionable or unclear product specifications, questions regarding the purchase order content, terms and conditions and any requirements — regardless of whether the requirements are or may be particularly difficult or costly for the supplier to meet. By addressing these concerns early in the design and pre-production phases, the supplier relationship can achieve the best economic advantage for both parties.

CAPACITY & PRODUCTION PLANNING

The Capacity & Production Planning (CPP) goal is to ensure continuity of supply to all LII locations. CPP is a tool to verify the supplier's (including sub-suppliers) processes are capable of meeting LII's volumes with quality parts. The supplier is also responsible for evaluating their component and material inventories and lead times to ensure supply will meet planned demands. If the production process fails to produce enough acceptable material to meet the required capacity + 30%, the supplier should continue to work on improving production capacity and/or capability.

Supplier Responsibilities:

1. The supplier may be required to prepare and submit their CPP documentation at least annually using the supplier's current manufacturing site(s) with all production tooling, equipment, environment, personnel, facilities, cycle times, and support systems.
    a. CPP is recommended for all new suppliers.
    b. CPP may be required on an annual basis.
2. Although the CPP should be conducted as early as possible, key considerations in completing the review are stability of the design, stability of the manufacturing process, manufacturing lead times/flexibility and significant changes in demand.
3. The CPP forecast quantity/volume will be provided by LII sourcing personnel through normal channels. Typically, the forecasts are updated by the LII manufacturing facilities on a weekly basis and available to each supplier. The supplier is to identify the production equipment dedicated to producing the parts. It is also recommended that the review include normal operator breaks, planned downtime, and changes in operators, perishable tools, raw material lots, etc. where economically feasible.
4. The capacity planning worksheet should be used to summarize the results of the CPP. The CPP worksheet should be completed for the currently known forecast period.
5. The supplier shall have at least 30% extra capacity to handle variable customer demand. CPPs that fail to meet our requirements need immediate communication and action plan. The action plans must include a timeline when deficiencies will be addressed. Unsuccessful reviews should also be brought to the attention of the LII Sourcing Manager, Buyer and SDE involved with the project.

PRECEDENCE OF REQUIREMENTS

Compliance with these Guidelines and the terms of any applicable purchase agreement and/or terms or conditions is mandatory.. These Guidelines identify the expectations of LII suppliers and its supply chain’s fundamental quality system. The Guidelines within this document are provided as a supplement, not as a replacement for altering the terms or conditions with pre-established agreements, engineering drawings, or specifications.

If conflicting interpretations of these Guidelines arise, the terms of any applicable purchase agreement and/or general terms and conditions shall control.

All necessary testing outlined in the purchase order and / or drawing, including, but not limited to, tensile, pull, torque, crush, color matching, chemical, cross-hatch testing, salt spray testing, pressure testing, and hardness testing shall be performed by the supplier as required by LII.

CONFORMANCE TO REQUIREMENTS

Suppliers are ultimately responsible for the quality, timely delivery, and technical services of products furnished to LII. The supplier's quality system, through prevention and control plans, shall assure timely delivery of product to required quality levels and at optimum cost.

Suppliers shall perform and document all applicable inspections and tests required to substantiate product conformance to specifications and ensure that their sub-contractors do the same. The documented inspection and test results (real-time statistical process control (SPC) data is preferred) and must be traceable to production runs.

When requested by LII, this information is to accompany each product shipment to LII in support of pre-certification review and the certification process. The supplier's certificates of compliance (C of C) must contain at a minimum the following information:

1. part name
2. material composition used to manufacture the parts
3. LII drawing number and revision letter
4. serial numbers (If applicable) or lot numbers / date code, for traceability
5. quantity shipped per lot / date code
6. LII purchase order number
7. supplier name and address
8. signature and title of quality authority signing the document

Suppliers and its subcontractors and/or agents involved in the production or delivery of goods or services to LII shall adhere to all applicable laws, regulations, and prohibitions of the United States and the countries within which such goods are produced or delivered, including laws related to business and labor practices, such as regulation governing the work conditions, wages, hours, minimum age of the workforce and prohibition against discrimination. Supplier shall ensure goods have not and shall not be produced or manufactured, in whole or in part, by convict or forced labor.

PRESERVATION, PACKAGING, LABELING AND SHIPPING

Suppliers are to comply with all specifications or purchase order shipping requirements. If requirements are not specified, the supplier is responsible to develop, maintain, and implement adequate handling and control of packaging to ensure the quality of the component or product is preserved throughout the manufacturing, handling, storage and distribution process to protect the product from damage, deterioration, substitution, or loss in transit.

Lennox suppliers are urged to follow the ISTA Series 2 testing requirements assuring product protection during material transport.

Age-sensitive materials will be controlled by a first-in, first-out process. Suppliers will ensure all time-sensitive, temperature-sensitive or limited-life materials (glues, elastomers, paints, etc.) are properly identified and controlled to prevent degradation or an adverse effect by their improper use on product manufactured for LII.

All exposed electro-static discharge (ESD) sensitive components, sub-assemblies, and assemblies shall be packaged in compliance with our requirements outlined in ES-0375 prior to shipment to LII.

Package labeling shall comply with ES-0365 and be legible, identifying at a minimum the LII part number, quantity, LII purchase order number, and supplier's/manufacturer's name and address. Commercial catalog parts require inclusion of a packing slip or packing list, which will identify the LII

purchase order number and the quantity of parts contained in the packaging. Packaging of product samples must be clearly marked with the word "Samples."

Shipments of multiple containers shall have each container identified, for example, 1 of 3, 2 of 3, and 3 of 3. All required shipping documents and records shall be placed within or in an attached envelope on container number 1 of the multiple containers.

NON-CONFORMING MATERIAL CONTROL

Shipped material and product that do not conform to LII specifications and standards will be rejected and may be stored, returned, sorted, reworked or repaired at the supplier's expense. All cost recoveries imposed on LII by its subsequent customers due to any supplier's nonconforming product conditions will be passed on to the responsible supplier. LII will notify suppliers of nonconforming material/product as soon as possible, and will work to minimize the cost to the supplier, while continuing to meet the needs of LII's customers.

CORRECTIVE ACTION REQUESTS AND RESPONSES

LII will notify the supplier, via a supplier corrective action request; SCARs are provided via QRCT System (Reliance), of all non-conforming material received, and will coordinate the material's containment and disposition with the supplier.

The supplier shall respond in writing to the LII SCAR originator within 24 hours with the containment and interim action plan. The supplier has ten (10) business days to identify the root cause of deficiency, long-term corrective action plans, the effective date(s) for completing the plans, and inform LII of the impact the deficiency may have upon production schedules, all existing inventories (supplier & LII), and in-transit materials. The supplier is expected to immediately contain all suspect material, implement the planned corrective actions, and to perform verification activities to ensure the corrective actions effectiveness.

A quality conference may be requested with the supplier when LII determines a continuing deficiency exists. The quality conference will review the seriousness of the situation and the impact on the supplier's performance rating, and will establish commitments to recommended actions and associated schedules for improvement. LII supplier development engineering and sourcing representatives will perform follow-up activities to verify the effectiveness of the corrective action.

Suppliers must use LII's QRCT System (Reliance) SCAR (8D) format to document all actions to contain and correct SCAR identified concerns.

Quality Process Requirements

RECORDS

All quality records must be retained by the supplier for the production life of the product. unless otherwise agreed to in writing by LII. These records must be stored in an environment that does not allow document deterioration and must be readily accessible upon request by LII. Suppliers shall make available any and all quality-related records, at the request of LII or any other agency such as UL, CSA, or ISO.

EQUIPMENT AND CALIBRATION CONTROLS

Suppliers are responsible for ensuring all processing and measuring equipment used in their process is suitably specified and fit for use. Suppliers shall develop a calibration schedule and maintain a controlled system to ensure equipment is properly maintained and calibrated to meet the equipment specifications. Calibration must be traceable to NIST standards or national certification organization.

It is expected suppliers will use measurement devices that have a resolution more than 1/10th of the process variation and tolerance range. The measurement devices must also be at least two (2) times more accurate than the most stringent drawing tolerance. The calibration system and calibration records for measuring devices shall evaluate measuring system bias and linearity and contain traceability to the equipment used during calibration, traceable to the National Institute of Standards and Testing (NIST), or to a comparable national certification organization.

Measuring System Analysis (MSA) or Gauge Repeatability & Reproducibility (GR&R) will be performed by the supplier on the supplier's process, inspection and tooling gages. A 10 part, 3 operator with 3 trial design using the ANOVA method of analysis is preferred. Less than 10% of the tolerance and process error is considered acceptable. More than 30% error is not acceptable. Measurement system is acceptable with distinct categories ≥ 4. To improve GR&R, evaluate methods in addition to equipment.

Any supplier equipment or tooling not meeting calibration requirements, or not having documented capability studies, must be approved in writing by LII prior to their use.

Upon determination that the supplier's equipment is out of calibration, supplier must immediately investigate the effect on product conformance that may have resulted from the out of calibration condition, and must immediately notify LII if non-conforming product may have been shipped to LII due to the equipment's out of calibration condition.

TRACEABILITY

LII utilizes the supplier's lot/date codes and/or serial numbers to track material incorporated into LII products. To trace the material's history when determining the root cause and bounding of an issue, the supplier must use lot/date codes or serial numbers to identify records of raw materials, processes, operators, acceptance, test, and process controls. This includes records of calibration, original compositions, and the engineering specifications found on the LII drawing. When required, the production data must be traceable to the 2D data matrix part serial number per LII ES-0365.

This requirement includes compliance certifications, such as UL / CSA / FCC / ANSI, etc. Suppliers shall flow these requirements down to their tier-two suppliers as required. The tier-one supplier is responsible for sub-suppliers' performance, and is responsible for their materials and processes on all parts submitted to LII.

SUPPLIED PARTS IDENTIFICATION

Suppliers shall identify manufactured product with a unique information number and / or the supplier's logo applied to the product where applicable and feasible. The marking shall be permanent and legible, in the form of indelible ink, engraving, or labeling. When specified, components must have material identification and traceability using bar-coding or data matrix labeling methods as described in LII Specification ES-0365. All shipping labels must also comply with ES-0365.

PLASTICS AND METAL MOLDING PROCESSES

LII requires all suppliers of plastic or metal molded components, and their subcontractors, to ensure molding machines are flushed or purged prior to any molding run for LII. The purge procedure shall purge the hopper, screw, nozzle, and dies or molds smelting pots prior to manufacturing when:

- making any color resin or metals changes
- changing molding materials
- the resin is too moist
- performing preventive maintenance

The use of recycled or regrind resin material is not permitted unless specifically identified on Lennox prints or specifications.

Failure to meet this requirement may result in contaminated and non-conforming product.

ASSET MANAGEMENT, MAINTENANCE, NOTIFICATION, AND ASSESMENT

LII requires all suppliers to identify, verify usage, protect and safeguard, and maintain all LII Assets (Both tangible and non-tangible) at Suppliers' property. Upon request, Supplier shall affix the identification of ownership - Asset ID Tags to the Lennox owned assets.

Suppliers must maintain a Master list of all LII tangible assets at supplier's property and must be able to produce records of preventive maintenance, inspections, maintenance, and major maintenance at the request of LII.

Suppliers must timely communicate and notify to obtain written approval from LII for any or all situations involving –

• Sudden damages and repairs/refurbishments

• Major repairs

• Need for spares

• Scrapping of tools and requirements for new tooling/die and/or molds

All requests must be submitted to LII Tooling & Die, Purchasing, Sourcing, Supplier Development, and Supplier Quality personnel using the LII **Tooling Condition: Notification Form, A20-2** prior to de-commissioning the LII Assets. Suppliers are expected to submit appropriate mitigation plans to ensure sustained continuity of production and service to LII and LII's subsidiaries.

LII reserves the right to conduct assessments and audits for all LII assets at any time with a 72-hour notice during the term of the asset possession at the supplier property. Supplier shall actively participate in the LII Tooling Maintenance and Assessment Program to demonstrate effective asset usage and compliance to the guidelines.

Upon receiving new assets, supplier shall conduct tool assessments and provide relevant feedback on the condition of the samples and asset compatibility on detailed LII tooling checklists. Following the tool assessments, supplier shall deliver appropriate PPAP package to LII factory Supplier Quality Engineer/Supplier Development Engineer and seek approval before full production.

REQUESTS FOR DEVIATION

LII does not advocate the production or use of non-conforming material. However, LII will consider requests for deviation that do not affect fit, form, or function of the product, providing the request is combined with immediate corrective action. Please submit all requests using the LII Supplier Deviation Request form, SD-1002.

Suppliers shall inform the supplier development engineer of non-conforming product prior to shipment immediately upon detection, to permit a timely fitness-for-use review by LII. Requests for deviation for non-conforming product may not be considered for "critical" quality characteristics.

CHANGES TO DESIGN, MATERIAL, PROCESS, OR LOCATION

Suppliers must notify and obtain written approval from LII for any changes to supplier's components, materials, manufacturing process, processing fluids, oils, or rust inhibitors, sub-suppliers, or manufacturing locations in advance of the change being made. Please submit all requests to LII Sourcing, Engineering and Supplier Development personnel using the LII Supplier Engineering Change Request form, SD-1001.

AUDITS

During performance of the purchase order, the supplier's quality system and manufacturing and inspections systems are subject to review, verification and analysis. When required by the LII purchase order, LII may conduct source inspections at the supplier's manufacturing facility. LII and / or its customer reserve the right to perform quality audits, with a minimum of 72 hours advance notification to the supplier and supplier agrees to allow LII or LII subsidiaries to conduct quality audits and audits of supplier's compliance with these Guidelines and any arrangements with LII or LII subsidiary.

Safety and Ergonomics

SAFETY

Our goal is to reduce the risk of injury to LII and suppliers' employees. When requested, LII and the supplier may work together to perform safety assessments and mitigate risks. This may include, but not be limit to:

Risks	Sources of Exposure
Cuts & lacerations	Sharp objects: 90 degree corners, edges, metal clips, protruding screws, nails, staples Packaging/Crating materials: straps, nails, screws, staples, clips
Struck By	Shipping containers: Instability from shifting/movement in transit Removal of securing method: straps/bands – plastic or metal, wood Packaging/Crating materials: straps, nails, screws, staples, clips Material presentation and handling: how do LII employees remove product from container? Material falls out of shipping containers? Heavy items (over 10 lbs/4.5 kg) may need coupling for manipulators/hoists or other agreed upon handling method
Chemical exposures	Insecticides/fumigants: provide Safety Data Sheets (SDS) Lubricants, chemicals used to prevent contamination: provide SDS Packing & crating materials: sprayed or dipped chemical treatments: provide SDS Adhesives & glues: provide SDS
Inhalation exposures	Product or packaging outgassing (VOCs) Packing & crating materials: dust, fibers, particulates

ERGONOMICS

In the simplest form, the goal of ergonomics is for the worker to be successful and avoid injury. Most often there is mutual benefit for the supplier and LII to identify ergonomic related risk and resolve it. Suppliers may be asked to work with LII to develop and/or provide ergonomic assessments prior to any shipments to allow enough time for review and risk mitigation. Assessments may include:

NIOSH Lift calculation for lift tasks of 4.5 kg (10 lbs.) and greater

Snook-Ciriello determination for horizontal tasks of 4.5 kg (10 lbs.) and greater.

Applicable assessment from the ANSI B11 TR1, REBA, RULA or other agreed upon assessment coordinated with LII.

Note that these assessment tools are publically available and may be obtained at little or no cost. Suppliers are encouraged to coordinate the risk assessment method with LII. LII also recognizes some very effective tools may already be used by the supplier and acceptable to LII.

Tasks to be assessed focus on material handling and may include:

Material handling from shipping means (typically the truck at an LII loading dock) to its initial place of storage.

Packaging removal to include bulk packaging and component packaging. This helps us understand how to get to the material.

Handling from container to the company product. For this material handling, part presentation in multiples of LII minimum production quantities, and object attributes, mainly weight and dimension, are key factors. It is important the vendor works with us to maximize our efficiency in getting their item onto our product.

Waste disposal/recycling to include pallet handling. Everything that is non-valued added for the company product is generally regarded as waste. Whether the material is discarded or recycled we need to understand the risk and minimize it to the lowest acceptable level.

The supplier is highly encouraged to work with LII and the LII receiving factory. Most often process inefficiencies and injury risks for the supplier and LII can be identified and resolved in this phase.

Assessments should consider the 5th percentile female (54.7 inches, 139 centimeters) through the 95th percentile male (75.2 inches, 191 centimeters) for the general population expected to interface with the material.

Mitigation of high risks to acceptable levels is a consideration of actively participating in LII's injury risk reduction process.

Counterfeit Material Avoidance

Recognizing SAE AS6174 and SAE AS5553, Lennox suppliers are expected to procure and/or integrate and test (confirm) conforming specified material .

Counterfeit material is defined as any of the following: misrepresented, copied or substituted without legal right, deliberately altered with intent to deceive, and/or previously used (refurbished or reclaimed).

Lennox suppliers are expected to have implemented processes that provide minimized customer risk due to pass-through or self-created counterfeit material.

Suppliers are urged to discuss potential counterfeit material concerns with Lennox Supplier Development Engineering or Lennox Procurement.

Defect Material Cost Recovery

Suppliers are expected to provide cost recovery/reimbursement when supplier provided defective product impacts LII production resulting in productivity loss. Productivity loss may be defined in a number of ways, but includes, not limited to, production down time, containment time, material rework time and resource time associated with defect root cause elimination.

Business Partner Code Of Conduct

Suppliers agree to comply with the Lennox Business Partner Code of Conduct. Suppliers shall be deemed to represent that they are and have been in full compliance with the Lennox Business Partner Code of Conduct, unless a supplier has provided LII with written notice to the contrary. A copy of the Lennox Business Partner Code of Conduct may be obtained from your LII Sourcing Manager.

Summary

Our vision is for all LII suppliers to implement and maintain a quality system that allows production and delivery of globally competitive high quality products and services with zero defects, delivered at the required time and clearly seen by our customers as superior in performance and value. LII expects our suppliers to conduct business with the highest degree of integrity in a socially and environmentally responsible manner.

Through open communications, with mutual and timely understanding of product and business expectations between LII and its suppliers, and with both parties working together toward common goals, LII's goal to achieve and maintain successful long-term business relationships with its suppliers can be sustained.

Appendices

Appendix A: Review

PPAP Elements

1. Design Records

A copy of the LII drawing and applicable specifications. If the customer is design responsible, this is a copy of customer drawing that is sent along with the purchase order (PO). If the supplier is design responsible, this is a released drawing in supplier's release system.

2. Authorized Engineering Change Documents

A document that records the detailed description of the change. Usually this document is called "engineering change notice"; however, it may be covered by the customer PO or any other engineering authorization.

3. Engineering Approval

This approval is usually the engineering trial with production parts performed at the customer plant. A "temporary deviation" usually is required to send parts to customer before PPAP. The customer may require other "engineering approvals".

4. DFMEA

A copy of the design failure mode and effect analysis (DFMEA) reviewed and signed-off by both the supplier and the customer. If the customer is design responsible, usually the customer may not share this document with the supplier. However, the list of all critical or high impact product characteristics should be shared with the supplier, so they can be addressed on both the PFMEA and the Control Plan.

5. Process Flow Diagram

A copy of the Process Flow, indicating all steps and sequences in the fabrication process, including incoming components.

6. PFMEA

A copy of the process failure mode and effect analysis (PFMEA), reviewed and signed-off by supplier and customer. The PFMEA follows the Process Flow steps, and indicates "what could go wrong" during the fabrication and assembly of each component, and records information evidencing that high risk issues have been mitigated.

7. Control Plan

A copy of the control plan is reviewed and signed-off by both the supplier and the customer. The control plan typically follows the PFMEA steps, providing more details on how the "potential issues" are mitigated through process controls and process monitors in the receiving process, the assembly process, or through inspection of finished products.

8. Measurement System Analysis Studies (MSA)

MSA usually contains the Gage R&R for critical or product key characteristics. Study results are documented to include evidence that measurement systems used to measure these characteristics are capable and are in calibration control.

9. Dimensional Results

A list of every print dimension and note shown on the ballooned drawing. This list identifies the product key characteristic, specification, the measurement results and the assessment evidencing that this dimension is "ok" or "not ok". Typically a minimum of 6 pieces is reported per each product / process combination.

10. Records of Material / Performance Tests

A summary of every test performed on the part. This summary is usually recorded in a DVP&R (design verification plan and report), which lists each individual test, when it was performed, by whom, the specification, results and the assessment (pass / fail.) If there is an engineering specification, usually it is noted on the print. The DVP&R shall be reviewed and signed off by both the customer's and the supplier's engineering groups. The quality engineer will look for a customer signature on this document.

In addition, this section lists all material certifications (steel, plastics, plating, etc.) that are required as specified on the print. The material certifications' records will demonstrate compliance to the specific print certification requirements.

11. Initial Process Studies

Usually this section contains all statistical process control charts that record process performance related to the most critical characteristics. The intent is to demonstrate critical processes are stable, process variation is at acceptable levels, and the process is running near the targeted nominal value.

12. Qualified Laboratory Documentation

Copy of all laboratory certifications from the laboratories that performed the tests reported in section 10, Records of Material / Performance Tests.

13. Appearance Approval Report

A copy of the AAI (Appearance Approval Inspection) form signed by the customer. This requirement is applicable only for components with key characteristics related to appearance or cosmetic features.

14. Sample Production Parts

Samples from the same lot of initial production run. The PPAP package usually contains pictures of the samples and documents where the sample is being retained (with the customer or the supplier).

15. Master Sample

A sample sometimes referred to as a "golden unit," that is signed off by customer and supplier. These units can be used to train operators on subjective characteristics or other attributes, such as appearance or for noise characteristics, and may be used when performing proof-of-station activities.

16. Checking Aids

When there are special tools for checking parts, this section will contain a tool drawing, tool calibration records, and dimensional studies results (GR&R) data.

17. Customer Specific Requirements

Each customer/part may have specific requirements to be included on the PPAP package.

18. Part Submission Warrant (PSW)

This is the form that summarizes the whole PPAP package. This form shows the reason for submission (design change, annual revalidation, etc.) and the level of documents submitted to the customer. There is a section that asks for "results meeting all drawing and specification requirements: yes/no" refers to the whole package. If there are any deviations the supplier should note the deviations on the LII Supplier Deviation Request Form or inform the customer that PPAP cannot be submitted.

19. Description of Packaging and Labeling (Shipping label & part label)

This is records, pictures, etc., of PPAP subject product shipping materials and labels (meeting Lennox approved requirements). When specified, LII requires shipping label compliance to ES-0365 requirements. component identification compliance to ES-0365 requirements. It is a good practice to ask the customer for PPAP packaging expectations before providing a quotation.

Quality Reliability Collaboration Tool, QRCT, Reliance

System used by LII to document PPAPs and SCARs

Tangible Assets

Raw material, jigs, fixtures, gauges, tools and dies, patterns, equipment, molds and other items

Non-tangible assets

Proprietary software package, electronic documents and drawings/prints, brands and TMs, copyrights, customer information etc.

End of Appendix A

Appendix B:

Reference Links and Documents

The following links and documents are supplemental to this specification and are applicable to this specification as referenced within this specification. Copies of documents may be obtained from the standards organization directly for normative standards or from LII directly for LII standards, specifications, or forms.

ISO 9001:2015	International Standards Organization, Quality Management Systems Requirements, Edition 3.
PPAP	Production Plan Approval Process, Automotive Industry Action Group, Edition 4, March, 2006.
FMEA	Failure Modes and Effects Analysis, Automotive Industry Action Group, 4th Edition, June 28, 2008.
http://www.aiag.org	Automotive Industry Action Group
ES-0365	Lennox International Engineering Standard
Control No. TBD	Lennox International Supplier Self-Assessment Worksheet
www.iatfglobaloversight.org	International Automotive Task Force
OHSAS 18001:2007	Occupational health and safety management systems – Requirements.
ANSI B11 TR1:	Ergonomic Guidelines for Design, Installation, and Use.
NIOSH Lift Equation	http://www.cdc.gov/niosh/docs/94-110/
Snook-Ciriello	https://libertymmhtables.libertymutual.com/CM_LMTablesWeb/pdf/LibertyMutualTables.pdf
REBA	Rapid Entire Body Assessment (Applied Ergonomics - REBA).
RULA	Rapid Upper Limb Assessment (Applied Ergonomics - RULA)

End of Appendix B

Appendix C:

Acronyms

Acronym	Definition	Acronym	Definition
AAI	Appearance Approval Inspection form	**LII**	Lennox International, Inc.
ASL	Approved Supplier Listing	**MDR**	Material Discrepancy Report
C of A	Certificate of Analysis	**MSA**	Measurement Systems Analysis Study
C of C	Certificate of Conformance	**NDA**	Non-Disclosure & Confidentiality Agreement
Cpk and Cp	Process Capability Indexes	**NIST**	National Institute of Standards & Testing
CSA	Canadian Standards Association	**NUD**	New, Unique, or Difficult
DOE	Design of Experiments	**PFMEA**	Process failure modes and effects analysis
DVP&R	Design Verification Plan & Report	**PPAP**	Production Part Approval Process
EDI	Electronic Data Interchange	**PSW**	Part Submission Warrant
ES	LII Engineering Specification	**QFD**	Quality Functional Deployment
ESD	Electro-Static Discharge	**SCAR**	Supplier Corrective Action Request
FMEA	Failure Modes and Effects Analysis	**SPC**	Statistical Process Control
ISO	International Standards Organization	**UL**	Underwriters Laboratories, Inc.
		WWSC	World Wild Supply Chain

End of Appendix C

Revision Notes:		
Date	By	Revision Note
Dec. 2019	JMH	2019 Version Updates: -Updated “Reliability Strategy & Requirements” -Added “Counterfeit Material Avoidance” -Added note regarding shipping package adequacy testing, ISTA Series 2 -Added “Defect Material Cost Recovery”
Feb. 2020	TT	2020 Version Updates: -Changed comment on RFQ/PO in Order Fulfillment -Added WWSC in acronym
April 2021	CM	2021 Version Updates: - Added. Quality Reliability Collaboration Tool, QRCT, Reliance across document - Added Asset Management, Maintenance, Notification, and Assessment requirements - Added QRCT in acronym - Replaced Validation process for ISO 9001-2015 for guidance instead Harmonization Task Force document GHTF.SG3.N99-10:2004. - Changes under PPAP PSW Approvals - Changes under CAPACITY & PRODUCTION PLANNING, 1 & 4 requirements. - Changes under EQUIPMENT AND CALIBRATION CONTROLS requirements.

