



LUXAIRE® QUALITY BUILT TO LAST

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“Quality is more than a strategy. It is a foundational commitment we make to our channel partners from distributor to dealer to end customer. It is a promise to provide the most reliable products and greatest value, and in doing so, to become the HVAC supplier of choice.”

– Elizabeth Haggerty
Vice President, General Manager
Unitary Products Group

INTRODUCTION

Since 1939, Luxaire has been setting the standard for innovative, high-quality heating and cooling systems across North America. This commitment to quality stands for performance, reliability, and efficiency in every product we sell. Since 2010, the Luxaire® Unitary Products Group (UPG) has implemented and communicated a new, more aggressive approach to quality. The result has been significant quality improvement—and customers are feeling the difference.

Quality is a promise to our customers as well as a strategic initiative central to our growth strategy. We recognize that quality generates customer satisfaction and goodwill, and our commitment is to make our quality better than anyone else's in the industry. To achieve best-in-industry quality, we engaged all functions, locations, and distribution channels, and we've leveraged knowledge from all Johnson Controls businesses.

Initially, we selected first-year warranty claims as the primary measure for quality. We targeted an 80 percent reduction in claims, which we knew would clearly separate us from the competition. We made significant progress toward our goal, reducing claims by over 50 percent in residential products, and now achieving similar improvement trends in commercial products.

Quality is a commitment that extends across our supply chain, including sourcing quality components, implementing state-of-the-art assembly and testing processes, providing industry-leading application, commissioning and startup services, and ensuring the quality of on-going field support and maintenance. Our comprehensive quality program is described in the following sections:

- ✓ Quality System
- ✓ Product and Process Improvements
- ✓ Technical Services Initiatives
- ✓ Technical Support Tools

QUALITY OPERATING SYSTEM

The Quality Operating System (QOS) defines the overarching tools, processes, and compliance mechanisms, including second- and third-party audits (such as ISO9000), that assure quality at Luxaire. The QOS connects and is supported by the four “pillars,” consisting of product development quality, supplier quality, manufacturing quality, and field quality, each with its own set of objectives, initiatives, and metrics.

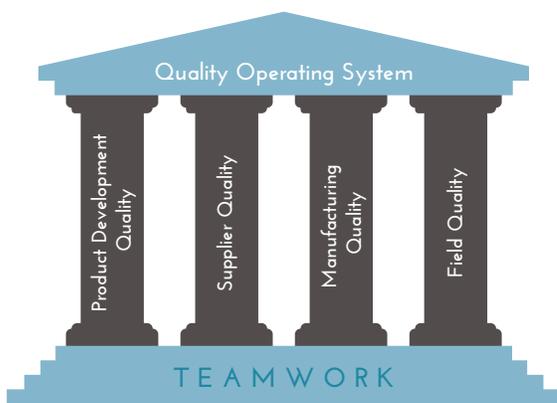
The pillars define what it takes to provide the quality experience... a robust product development process, suppliers with the highest quality standards, highly controlled manufacturing processes, and top-notch technicians to install and support our products in the field.

The Quality Operating System rests on a solid foundation of teamwork. A system by itself can only go so far—our promise is kept by the employees who live quality and use state-of-the-art facilities to assure quality.

The “four pillar” strategy is the framework that covers the full breadth of Luxaire quality initiatives. Elements of the system include:

Value-Stream Teams: Cross-functional Value-Stream Teams drive current-model quality improvement. The teams cover all nine major product families and include representatives from engineering, manufacturing, quality, purchasing, and product management. The teams prioritize their projects based on warranty data and call center input. Their work includes: tracking warranty trends for their product family, maintaining a database of quality issues, analyzing problems, implementing solutions, and confirming results.

Quality Council: The Quality Council provides an opportunity for the Value-Stream Teams to interact with executive management in person each month to review metrics and discuss plans going forward.





Gated Product Development

How PDP Works: Our gated product development process turns a detailed eye to all deliverables required, from the ideation phase all the way to production.

How PDP Works: Our stage-gated product development process brings detailed scrutiny to all deliverables required, from ideation to production launch and post-launch support.

Product Development Council: While the Quality Council focuses on current products, the Product Development Council focuses on future products. The Product Development Council provides an opportunity for each Product Development team to interact with executive management in person each month. At stage-gate reviews, projects are reviewed against specific deliverables required.

If all project deliverables are not satisfactorily completed, the project will not progress to the next stage. If necessary, the launch is deferred until all deliverables, whether related to product testing, manufacturing process, or supporting literature, are ready.

Organization: We continue to strengthen the quality organization. Chet Sears, director of Quality, operates independently of any functional group, reporting directly to Elizabeth Haggerty, vice president and general manager of Unitary Products. Chet’s organization includes the quality managers for the Norman, Oklahoma, and Wichita, Kansas, plants, plus the supplier quality, warranty administration, and quality statistics groups. Some members of Chet’s quality staff have in-depth experience in the automotive and aerospace industries, which by nature require high and uncompromised quality systems and processes, and several on the quality team have advanced degrees and Six Sigma Master Black Belt certifications.



The HALT facility can test up to 24 systems at one time.

Highly Accelerated Life Testing: We recently commissioned our Highly Accelerated Life Testing (HALT) facility in Wichita. The facility enables us to simulate a five-year equipment life in four months, validating the performance and reliability of new air conditioners and heat pumps during the development phase, well in advance of production.

Environmental Testing: A companion capability is our environmental test labs, which enable us to study outdoor equipment in extreme environments, simulating conditions from Phoenix to Fargo and all climates in between. The labs are capable of reaching temperatures ranging from -30°F to $+130^{\circ}\text{F}$ and can simulate sleet, snow, rain, and rolling fog, so we can understand equipment performance in any weather conditions. If you want to see snow in Kansas in July, the environmental test lab is the place to be!

Warranty Return Center: The Wichita Warranty Return Center continues to contribute valuable insights into field returns. Numerous improvements in control boards, motors, and coils have been made as a result of findings from returned equipment teardowns.



PRODUCT AND PROCESS IMPROVEMENTS

From design to product testing, Luxaire systems are built with meticulous craftsmanship in our North American factories. Luxaire products are designed, engineered, and assembled in North America, close to home and close to the markets we serve. Significant investments in product, process, and people are making a difference in places like Norman, Oklahoma, Wichita, Kansas, and Milwaukee, Wisconsin. We pride ourselves on quality built close to home.

A number of specific actions have strengthened our quality commitment:

Plant Revitalization: In 2009, we initiated a revitalization program to improve material flow, line-side storage, and workstation ergonomics in our assembly areas. The program has since been expanded to upgrade and automate fabrication processes. This program impacted nearly every production area in Norman and Wichita, and represents a \$35 million commitment to operational excellence.

Workforce Stabilization: We have stabilized our workforce by reducing seasonal fluctuations in staffing and building inventory in advance of busy season. This workforce stability enables us to focus on quality and employee development instead of managing to keep up with busy season demand. “Level staffing” combined with plant revitalization has paid dividends in workforce morale, retention, productivity, product availability, and quality. We continue our commitment to level staffing, as there is no substitute for a highly trained and stable workforce.

MicroChannel Coils: In 2010–2011, a number of enhancements were made to MicroChannel coils, including an enhanced alloy system with higher grade materials less susceptible to coastal corrosion, an improved tube zinc coating process, a PVC mesh screen to make

the coil more resistant to mechanical damage, and an e-coat option, proven electro-coat technology for corrosive environments.

Extensive lab and field tests showed that these changes would improve coil life, particularly in corrosive environments, and improved warranty performance validated the lab test results.

Braze Quality: An improved process incorporating gas flux in the braze process is being implemented across all lines, providing more consistent, higher quality, cleaner braze joints.

Torque Control: We’ve implemented automotive-style torque controls, particularly on critical fastening operations involving fan blade assembly and furnace orifices. This program has recently been expanded to include other critical fastening operations for motors, compressors, and other components.



Reliability testing extends to extreme corrosive environments, both in labs and harsh field conditions, including coastal corrosion depicted above.

Component Reliability: Tearing down returned components from the field has yielded improvements such as control board coating enhancements, tighter shaft-to-bearing tolerances on motors, improved gas valves components, stronger solder joint designs on control boards, better economizer designs, and many other improvements.

Error-Proofing: We put a major focus on “error-proofing” both designs and processes. For example, we added automated visual inspection in several areas to ensure part presence, added product features to ensure proper door alignment, and improved designs and assembly fixtures so that products can only be assembled the correct way.

Automation: Automation has expanded in areas requiring repeatability, such as laser cutting, mechanical bending, application of RTV silicone sealant, heat exchanger assembly, brazing operations, and robotic loading and unloading operations.

Packaging: Packaging design has been a special focus for commercial products, which are shipped on flat beds exposed to the environment during transportation. Improved packaging was designed to better protect coils and keep packaging intact even in harsh weather conditions.

Leak & Functional Checks: Leak and functional tests confirm the integrity of the refrigeration system and correct functioning of the unit prior to shipment. If a unit fails a single test parameter, the system will not allow a shipping tag to be printed, preventing such units from getting to the field.

Sensitive leak detection methods and multiple leak checks are performed on every unit prior to shipment. Functional test equipment measures and records dozens of parameters on each unit at the end of the line. On commercial products, individual refrigeration circuits are tested independently in multiple circuit applications.

Because of the sophistication of our acceptance testing, operators who test and accept products for shipment are required to complete advanced training on the equipment and process.

To watch the Luxaire quality story in action, visit www.joinluxaire.com/quality

TECHNICAL SERVICES INITIATIVES

The quality initiatives in design and manufacturing are helping to ensure quality of product. Technical service—providing capabilities to ensure trouble-free installations—completes the delivery of our quality promise.

Active, Not Reactive: Technical Services is transforming itself from a reactive resource—solving problems after the fact—to a proactive partner with our customers. “Proactive support” means using our technical capabilities to minimize the number of issues before they occur through training, coaching, and call center support. As part of this process, we expanded our Technical Services group to accommodate additional roles, including Regional Technical Support Managers who work with you at your site to support proactive technical services.

Because tech services personnel are first to hear about field issues, each Value-Stream and Product Development team has a tech services representative who acts as the voice of the customer. This ensures that the customer’s voice is heard by the teams focused on current and new products.

Beyond the Luxaire Walls: Training for customers is a key element of technical service. Our highly rated ProficienTech™ on-line training now includes “live” factory-based training and certification programs. For experienced

technicians, live training includes advanced courses for application, startup/commissioning, and commercial controls. For new service managers, we offer “QuickStart,” a three-day familiarization course covering UPG policies, service procedures, and products. Over 600 people have attended one or more of the on-site course offerings, and thousands more have gone through companion on-line training.

Our world-class training facility, only two miles from the Norman, Oklahoma, plant, has eight operating commercial systems representing our complete range of commercial product. The facility includes an indoor and outdoor lab, along with two classrooms.

Certification Ensures Quality: Certification training is available to all distribution channels, including dealers, contractors, and distributors. Certification requirements are rigorous and include on-line, classroom, and hands-on training, along with companion testing. These requirements help ensure the highest level of competency for technicians who work on our equipment.

We are so confident in the commercial certification program, we extend DOA labor allowances from 30 to 90 days when a certified technician performs startup.

New Service for Smooth Startup: Application, startup, and commissioning (ASC) services bring oversight from certified technicians (ours or yours) to complex commercial installations. This service is valued by customers who appreciate the advice of the most highly trained technicians.

Call Center Improvements: We have made significant strides in our call center through the use of Service Cloud, our case management software. Service Cloud helps us improve the quality of our interactions with you:

- Allows each call to be documented as a case and tracked to closure.
- Generates statistics about who and why people are calling.
- Provides access to more than 15,000 documents covering 10+ years of technical

literature, including wiring diagrams, service letters, and I&O instructions, all accessible through Google-like search capabilities.

- Pre-populates the technician's screen with caller information and recent case history, if caller ID is recognized.
- Provides third-party access to your service managers so they can submit and track their own cases and access the same documents as our technicians.

Service Cloud capabilities expand our capacity to handle incoming calls, make service techs more effective, and deliver additional services to customers. Most important, our systems have allowed us to proactively document and resolve field concerns—sometimes even before the first warranty claim is submitted.



Commercial Training Center, Norman, Oklahoma.



Scan to see facility video.

TECHNICAL SUPPORT TOOLS

Luxaire prides itself on delivering innovative systems that deliver premium comfort. We're always looking toward the future, partnering with distributors and dealers as we solidify our plans. For example, technical support tools have been significantly upgraded with your input, namely UST, mobile apps, and UPGnet. These support tools incorporate innovative designs that make a difference for the people who select, install, and service our equipment.

Unitary Sales Tool (UST)

- Our goal is to make UST the selection tool of preference for specifying engineers. Enhancements completed and underway are providing competitive capabilities in technical data, functionality, ease of use, and integrated engineering and commercial capabilities. Recent enhancements include:
 - Extending the use of the tool to specifying engineers.
 - Performance-based selection, which allows users to specify equipment with minimal knowledge of UPG product.
 - Simplified and standardized drawings and nomenclature.
 - Additional selection capabilities based on lead-time requirements—whether a unit is required in two days or 15 days, only applicable stocked models are displayed.
- Error-proof logic to ensure that only applicable controls and accessories can be specified.
- The ability to quote services, such as ASC services, in addition to equipment.
- Customized output options, so proposals can reinforce your branding and corporate identity.
- Cross-reference guides for commercial replacement units.

The team is now proceeding with the next major selection tool advancement—to seamlessly integrate UST with “opportunity management” using the most advanced cloud-based CRM tool available from Salesforce.com. This capability will provide visibility to your portfolio of prospects and enable your team to track opportunities from initial lead through bid award. We will be deploying this new capability along with other enhancements in the coming months.

Mobile Apps

We continue to introduce new mobile apps, recognizing that today's homeowners are more technology savvy than ever, and customers appreciate contractors who leverage technology capabilities. Available for Apple®- and Android-compatible devices, mobile apps provide assistance for sales and service.

For salespeople, mobile apps include immediate access to sales brochures, credibility videos, product catalogs, and in-home selling and proposal tools. For service techs, mobile apps include warranty verification, parts lookup, access to service letters, manuals, ProficienTECH training, and other literature. We will continue to expand on these capabilities going forward.



UPGnet

We continue to focus on making UPGnet more user-friendly and easier to navigate. Currently, we are in the process of enhancing our SmartSearch capabilities to allow for more visual and interactive isometric drawings to allow a technician to more easily select the right part as well as to quote and purchase the part in far less time than previously experienced. This enhanced SmartSearch is deployed on recently released products and will continue to be deployed over the coming months on existing and new products.

The Luxaire quality promise depends on the valuable feedback from those who rely on our products. Input from our customers is critical to UPG's quality initiatives, and individuals representing a broad range of distributors and dealers have dedicated many hours to support these initiatives, including:

- Beta testing new product performance, reliability, installation, and serviceability.
- Participating in the advisory councils for UST, mobile apps, and UPGnet.
- Documenting concerns and offering product improvement ideas.

Your engagement in the quality improvement process is invaluable, and we thank you for your support.

We are working hard to bring all our initiatives to reality, and sincerely welcome your thoughts. Do you feel we are on the right track? Are you feeling the difference? What areas do you feel require more focus?

We look forward to hearing from you.

Feedback should be shared with:



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To watch the Luxaire® quality story in action,
visit www.joinluxaire.com/quality

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Luxaire® products are
recognized for quality.



The Luxaire® Acclimate™
Series LP9C modulating gas
furnace received the Consumers
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