Copeland™ Authorized Wholesalers

Addressing Today's Refrigeration Challenges

EMERSON™

Giving Contractors a Comprehensive Support Network

The unprecedented changes happening in today's commercial refrigeration industry have put contractors in an unenviable position. Not only do they have to keep up to date with new equipment, technologies and applications, they're still the first line of defense when a refrigeration problem needs to be fixed — 24 hours a day, seven days a week. Emerson understands these challenges. That's why we've created a vast Copeland™ authorized wholesaler network and aftermarket support programs. These resources give contractors the tools they need to address today's refrigeration challenges and keep their customers happy:

- More than 850 Copeland authorized wholesaler locations
- 160,000 compressors
- 341 Copeland Technical Specialists
- State-of-the-art distribution center delivering 32,000 same-day shipments per year
- 12 customer service representatives answering 60,000 annual calls
- 24/7/365 emergency product locator for Copeland compressors

The Copeland Advantage

Emerson has long served the commercial refrigeration industry's supermarket, restaurant and convenience store markets. Its Copeland compressor lines have continuously set the standard in performance and reliability. With the industry now in the midst of sweeping regulations — including the Department of Energy's (DOE) energy efficiency minimums and the Environmental Protection Agency's (EPA) refrigerant rulings — Emerson is leading the development of the next generation of refrigeration technology.

Only Emerson has the extensive research and development facilities, expert engineering teams, quality control programs and certified testing labs to deliver the reliable performance that the industry has come to expect from our comprehensive Copeland compressor portfolio. We understand the real challenges you face, and we're developing the strategies, expertise and breadth of products to help you successfully make this transition.

To find the nearest authorized, full-line wholesaler, download our Copeland Mobile app.

Copeland Technical Specialist Program

To ensure the highest level of customer service and application expertise with Copeland compressors and condensing units, many of our Copeland authorized wholesalers employ a certified Copeland Technical Specialist (CTS) at their branches. Each CTS must complete an in-depth Copeland training and certification program that includes the following requirements:

- Attendance of the Compressor Operation and Service seminar
- Passing the Fundamentals of Refrigeration/AC online course with a 75 percent or higher grade
- Completion of a week-long CTS course at Copeland headquarters
- Passing the final CTS exam with a 75 percent or higher grade

Copeland Compressor Experts at Your Service

The certification process ensures that each CTS has the tools and hands-on expertise to address a variety of refrigeration system application questions. Among the many benefits of the CTS program include:

- A dedicated Copeland product expert at major wholesale branches
- Ability to help technicians quickly diagnose system issues and solve problems
- Timely and accurate responses to technical inquiries from customers
- Promote sales growth, customer trust and rapport

Each specialist is required to continue their education and stay informed of any changes in regulations or technologies that may impact refrigeration applications. From selecting the right compressor for your application to providing consultation on refrigerant retrofits, your local CTS can help you make the most informed decisions for your business and customers.

▶ For contractor training opportunities, visit EmersonClimate.com/education

A Perfect Regulatory Storm

For several years, the commercial refrigeration industry has been forced to come to terms with a dynamic and often uncertain regulatory environment. First, the Environmental Protection Agency is phasing out commonly used hydrofluorocarbon (HFC) refrigerants while proposing a list of acceptable substitutes via its Significant New Alternatives Policy (SNAP) program. Meanwhile, the Department of Energy is mandating new energy efficiency improvements to a variety of commercial refrigeration equipment classes. The convergence of these two regulatory fronts has created the perfect storm — a once-in-a-generation occurrence that promises to permanently reshape the commercial refrigeration landscape.

Transitioning From HFCs to Lower-GWP Refrigerant Alternatives

Per its final ruling on July 20, 2015, the EPA has changed the listing status of several common refrigerants to "unacceptable for use" in many commercial refrigeration applications. Among these 'delisted' refrigerants are R-404A, R-507A, R-410A, R-407A/C/F and HFC-134a in specific applications. The EPA continues to propose additional "change of status" notices through its SNAP initiative as addendums to the 2015 ruling.

As a result, the entire commercial refrigeration industry must soon make the transition from high-GWP HFCs to lower-GWP refrigerant alternatives. The EPA has proposed a list of natural and new synthetic substitutes to help make this transition and meet sustainability targets. It's important to note that each refrigerant alternative has unique thermodynamic properties that impact system design and service requirements — potentially including building code and/or safety implications.

Emerson has been testing these refrigerant alternatives for years and has prepared EPA-compliant compression technology to make this transition.

At the eye of the storm you'll find two primary issues: refrigerants and energy efficiency. Competing for our undivided attention are the EPA's recent SNAP rulings and the Department of Energy's energy efficiency mandates — all of which have major implications to our industry.

Section 608 Calls for Improved Leak Detection

Among the EPA's most recent SNAP proposals is an amendment to Section 608 of its Clean Air Act pertaining to the safe handling and management of refrigerants. The ruling, effective Jan. 1, 2019, encompasses the regulation of HFC refrigerants and lowers the leak rate threshold from 35 percent to 20 percent in commercial refrigeration equipment containing 50 or more pounds of refrigerant. Notably, it also requires owners/operators to deploy continuous monitoring via leak detection devices in equipment that has exceeded the threshold leak rate and submit reports to the EPA.

Meeting New Energy Efficiency Targets

Beginning March 27, 2017, the DOE will impose a 30–50 percent reduction in energy consumption on reach-in, stand-alone commercial refrigeration equipment, as measured in kWh per day. The deadline is the first of several significant energy regulations to impact the commercial refrigeration industry in the coming years, including: new efficiency targets on automatic ice makers, walk-in coolers and freezers. With the initial deadline only months away, foodservice OEMs should presently be active in the engineering and design cycle in order to meet the DOE's imminent standard. To become the trusted advisors that their customers seek, contractors must be aware of all the technologies and architectures that are used to achieve these efficiencies.

One Design Cycle or Two?

The timing of the DOE and EPA regulations — less than two years apart — poses further challenges to OEMs who must decide to approach each ruling separately or combine compliance of both regulations into a single design cycle. OEMs will need to allot the required laboratory time to thoroughly test their units for requisite UL and NFC certifications, and make the necessary design adjustments to achieve DOE compliance. All reach-in equipment is required to be registered in the DOE's compliance certification management system (CCMS).

Emerson has the breadth of products, knowledge and resources to help you address each regulation separately or combine into a single design cycle.

▶ For the refrigerants and lubricants approved for use in Copeland compressors, visit EmersonClimate.com/documents/93-11.pdf

Emerson Perspective:
EPA'S FINAL RULE AND DOE ENERGY REGULATION TIMING

EMERSON

Phase-out Refrigerant	Super-market *New*	Super-market *Retrofit*	Remote CDU *New*	Remote CDU *Retrofit*	Stand-alone			
					MT <2,200 BTU/hr. and not contain flooded evap. *New*	MT >2,200 BTU/hr. with or without flooded evap. *New*	LT *New*	LT and MT *Retrofit*
R-404A/507A	Jan. 1, 2017	July 20, 2016	Jan. 1, 2018	July 20, 2016	Jan. 1, 2019	Jan. 1, 2020	Jan. 1, 2020	July 20, 2016
R-410A	OK	–	OK	–	Jan. 1, 2019	Jan. 1, 2020	Jan. 1, 2020	–
R-407A/C/F	OK	OK	OK	OK	Jan. 1, 2019	Jan. 1, 2020	Jan. 1, 2020	OK
HFC-134a	OK	OK	OK	OK	Jan. 1, 2019	Jan. 1, 2020	OK	OK
DOE Energy Reduction Compliance			Jan. 1, 2020 (Walk-in)		March 27, 2017	March 27, 2017	March 27, 2017	

Both DOE and EPA rulings take effect in the 2017–2020 time frame. But, the effective dates of respective rulings don't necessarily correspond. To avoid a duplication of efforts, OEMs should attempt to satisfy both requirements in one product development cycle.

Achieving New Efficiencies From Traditional Rack Systems

It's estimated that at least 70 percent of grocery stores in the U.S. use a centralized, direct expansion refrigeration architecture based on parallel racks of compressors. These compressor banks share low- and medium-temperature suction groups and discharge lines that circulate refrigerant to designated cases throughout the store.

Today's supermarket operators are seeking new technologies to enable their rack systems to comply with EPA regulations and improve energy efficiencies. Even though some HFC refrigerants are still permitted in rack systems, many operators are faced with the prospect of moving to an acceptable refrigerant option. We can help you assess the possibility for retrofit or recommend a replacement system.

Regardless of your refrigeration system architecture, Copeland Scroll™ ZF and ZB compressors deliver high efficiencies and reliable performance for years to come.

For the most up-to-date information on Copeland products, download our Copeland Mobile app.

Copeland Scroll ZB*KCE compressor

IMPROVED PERFORMANCE IN LOW TEMPERATURES

The Copeland Scroll ZF*KVE compressor has been specifically designed with vapor injection technology to provide a 50 percent increase in capacity and 20 percent increase in efficiency in low-temperature applications. The ZF*KVE compression cycle is similar to a two-stage cycle with inter-stage cooling, except that it takes place within a single compressor. This sub-cooling in the middle of the compression process enables it to provide significant performance gains.

HIGH EFFICIENCY FOR MEDIUM TEMPERATURES

The Copeland Scroll ZB*KCE compressor is optimized for medium-temperature applications and offers on average a 23 percent improvement in annual efficiency. With more than 5.5 million compressors installed worldwide in single-compressor systems, parallel racks and distributed architecture systems, the Copeland Scroll ZB*KCE is the industry standard in reliability.

ADVANCED DIAGNOSTICS AND PROTECTION

CoreSense™ technology allows contractors to accurately diagnose and troubleshoot system issues — either at the customer's site or remotely via mobile device or computer. One of the most obvious benefits is its ability to protect the compressor from damage, primarily through its system trip or reset functions. This enabling technology gives contractors a wealth of historical system data that they can use, both for troubleshooting current issues or preventing system failures before they happen, including but not limited to:

- Over current protection
- Over/under voltage protection
- Unbalanced load detection
- Liquid injection

Digital Compressors Enable Precise Capacity Modulation

A digital upgrade refers to the process of retrofitting a digital compressor to serve as the lead compressor in a fixed capacity refrigeration rack. The upgrade allows the rack to modulate capacity from 10 to 100 percent and offer precise matching of capacity to changing refrigeration loads. It's an ideal solution for supermarkets seeking to achieve tight control over suction pressures, improve case temperature precision and reduce compressor cycling.

Retrofit Kit Components

To retrofit a fixed capacity rack to a system with capacity modulation, Emerson offers a Copeland digital upgrade (retrofit) kit comprised of either a Copeland Discus™ Digital or Copeland Scroll compressor and the following components: digital master controller; an open loop or stand-alone digital controller; tubing and valve kit; coil; and thermistor.

CAPACITY CONTROL IN NEW SUPERMARKETS

Digital compressors have proved so effective in providing capacity modulation that this strategy is being written into new design specifications of many big-box retailers. Copeland Discus Digital compressors with CoreSense technology have become the industry workhorse, offering digital modulation to enable precise capacity control while eliminating the traditional compressor cycling problems of uneven cooling and reduced compressor life. By minimizing temperature fluctuations, operators can extend the shelf life of perishable items and reduce food shrink. Through continued investments in this semi-hermetic technology, Emerson has made these units compatible with the latest acceptable HFO refrigerant blends.

▶ Contact a Copeland Technical Specialist for more details about our digital retrofit kits.

For the most up-to-date information on Copeland products, download our Copeland Mobile app.

Natural Alternatives — Emerging System Trends

To achieve compliance and meet corporate sustainability objectives, more businesses are evaluating refrigeration systems based on natural refrigerants. These naturally occurring substances — including CO_2 (R-744) and propane (R-290) — pose virtually no threat to the environment and are considered "future proof" options. CO_2 has proved extremely effective in low ambient temperatures, while R-290 provides high energy efficiencies and excellent thermodynamic properties. However, it's important to understand their unique design and application considerations.

Natural Refrigerant	GWP	ODP	Operating Considerations
Carbon dioxide (R-744)	1	0	• High pressure and low critical point • Very little danger to occupants in the event of leaks • Used in medium- and low-temp applications
Propane (R-290)	3	0	• A3, flammable • Very low charge requirements (currently 150 grams is the max)

The Propane Refrigeration Proliferation

Propane is a very low-GWP hydrocarbon that offers high-capacity, energy-efficient performance, often outperforming its HFC counterparts. As an A3 refrigerant, R-290 use has been historically limited by safety concerns and low charge limits. Modern compression technology and safe handling procedures have largely mitigated these concerns. Today, global foodservice and food retail operators are adopting R-290 as an effective alternative to R-404A and HFC-134a — especially in a wide range of low-charge, reach-in display cases.

STAND-ALONE EFFICIENCIES FOR REACH-IN CASES

While the EPA has listed R-290 as an acceptable refrigerant alternative in commercial refrigeration applications, its current low charge limit (150g) has largely limited its adoption to stand-alone, reach-in cases. Copeland A*E and R*T compressor lines are optimized for use with R-290 and serve as the engine driving our propane-based condensing units. Independent Emerson testing has demonstrated these units are capable of delivering up to 20 percent energy efficiency ratio (EER) improvements over R-404A, helping OEMs achieve needed energy consumption reductions for DOE compliance.

EMERSON PROPANE COMPRESSOR LINEUP

Model ASE — R-290 compressor

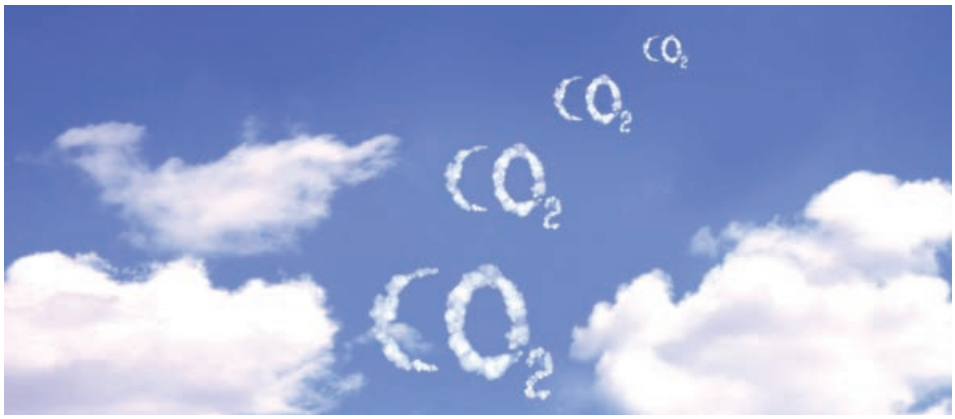
Low-Temperature

R-290	AFE06	AFE10	AFE13	AFE16	RFT22	RFT26	RFT37
Capacity (BTU/Hr)	626	980	1330	1643	2200	2640	3690

Medium-Temperature

R-290	ASE12	ASE17	ASE18	ASE24	ASE32	RST37	RST44	RST53	RST58
Capacity (BTU/Hr)	1200	1653	1789	2448	3240	3660	4420	5304	5772

Leave a Smaller Carbon Footprint With CO_2



CO_2 has proved to be a very effective alternative to HFCs in both low- and medium-temperature applications. CO_2-based refrigeration systems have been successfully deployed in commercial and industrial applications in Europe for nearly two decades, and have gained in popularity in the U.S. in recent years.

CO_2 Transcritical Booster Systems

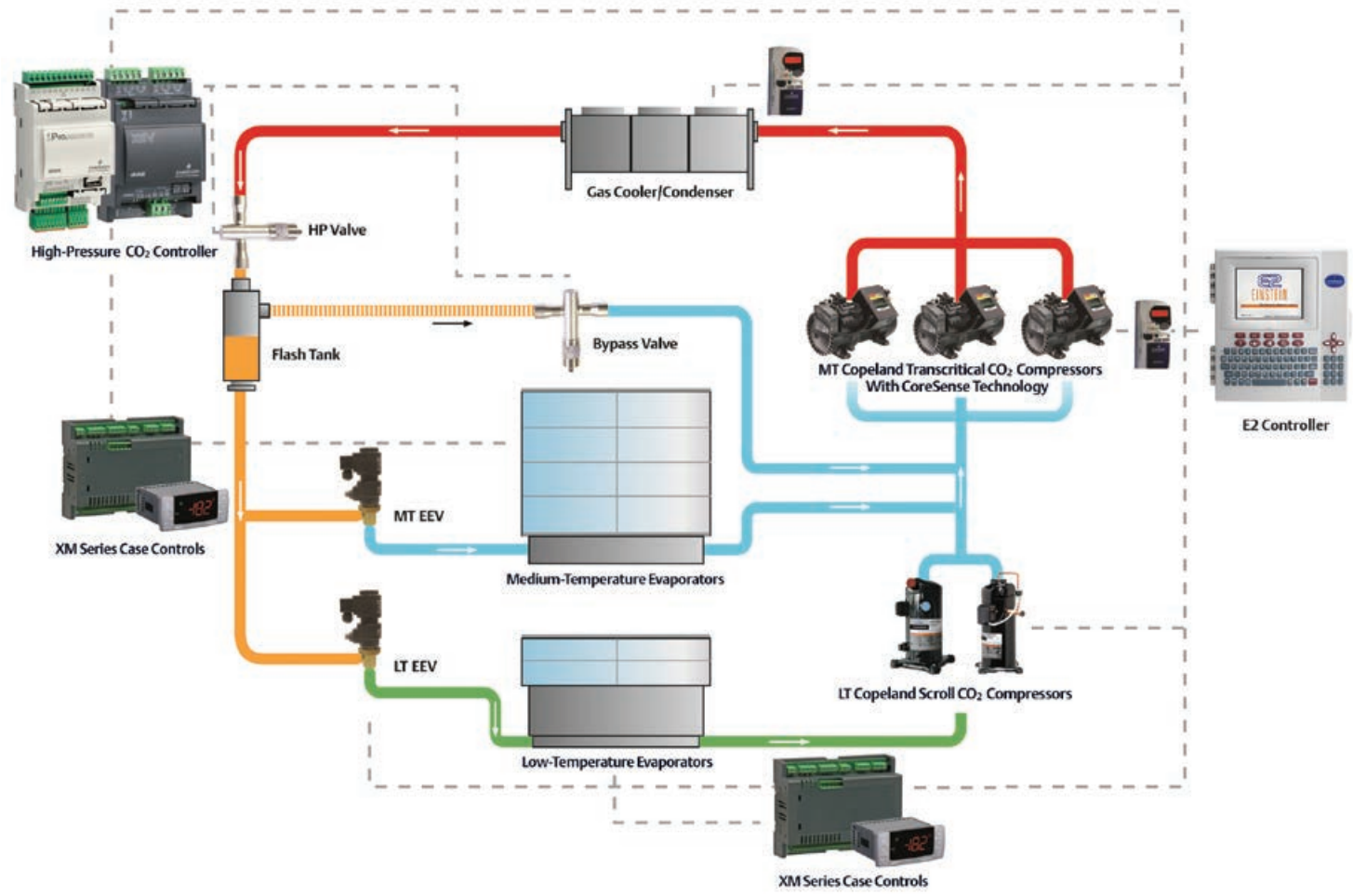
The Copeland line of four-cylinder CO_2 compressors is the ideal solution for medium temperature R-744 transcritical booster systems. All compressors are equipped with CoreSense technology, offering faster system troubleshooting and protection from problems before they occur.

CO_2 Subcritical Applications

Designed for low-temperature, subcritical CO_2 applications, the Copeland Scroll ZO compressor is well-suited for use in CO_2 cascade and booster systems. Copeland scroll technology delivers the efficiency, reliability and liquid handling advantages needed for these applications.

▶ For more information on CO_2, visit Emerson.com/CO2.

CO_2 TRANSCRITICAL BOOSTER SYSTEM



Reach-ins

Meeting New Efficiency and Environmental Targets

Stand-alone, reach-in cases are among the first class of commercial refrigeration equipment to be impacted by the DOE mandate. As of March 27, 2017, the DOE will impose a 30–50 percent reduction in energy consumption on reach-in, stand-alone commercial refrigeration equipment, as measured in kWh per day. Less than two years later, the EPA will begin phasing out the commonly used HFC refrigerants in this same class of equipment.

Reach-in manufacturers are evaluating lower-GWP refrigerant alternatives, both natural and synthetic blends, to meet energy and efficiency standards. These new refrigerants have unique thermodynamic properties that impact system design and service requirements. Emerson has been testing these alternatives for years and has prepared DOE- and EPA-compliant compression technology to make this transition.

M-line Condensing Units

Based on fractional horsepower compressors, Copeland M-line condensing units offer all the requirements equipment manufacturers and end users need to achieve optimal performance in low- and medium-temperature applications:

- Smaller footprint economies
- Minimal sound output for quiet operation
- Higher energy efficiencies to achieve DOE minimums
- Compatibility with alternative A1 and A3 refrigerants

This next generation compressor line comprises the basis of condensing units designed to improve energy efficiencies up to 30 percent through:

- Utilization of new refrigerant performance characteristics
- Electronically commutated fan motors
- Improved condenser coils

ENHANCE SERVICEABILITY VIA ELECTRONIC UNIT CONTROLS

The optional electronic unit controller allows contractors to improve the serviceability of reach-in units using M-line compression technology. Benefits include:

- Quick and easy setup
- Improved set-point accuracy
- Multi-refrigerant capability
- Troubleshooting and diagnostics
- Additional system safeguards

▶ For more information about achieving regulatory compliance, visit Emerson.com/E360.

Walk-in Coolers and Freezers

Efficiency Mandates Drive Innovation

Walk-in coolers and freezers (WICF) will be subject to 20–40 percent reductions as of Jan. 1, 2020, per the DOE's final rule on energy conservation standards. Efficiency of these units is measured according to the AHRI-1250 testing standard of annual walk-in efficiency factor (AWEF), and includes the equipment's entire operating envelope.

Both dedicated and multiplex architectures are covered under these AWEF requirements, and each class of equipment is assigned a specific equation to measure efficiencies.

Manufacturers have multiple design options to meet these targets, including improved compression technology, low condensing operation (floating head) and larger condenser coils. To achieve these substantial improvements to energy efficiencies, the Copeland Scroll compressor line has been expanded to cover a wider range of capacity and horsepower requirements for both low- and medium-temperature applications.

Copeland Scroll ZB*KA Compressors

The all-new, smaller-capacity Copeland Scroll ZB*KA line was designed for medium-temperature, walk-in applications in fractional horsepower displacements. These have been rated for use with new refrigerant alternatives — such as R-448A and R-449A — as well as R-407A, which is still acceptable for use in remote condensing units. Look for wide availability of these units by the summer of 2017.

Copeland Scroll ZF*KA Compressors

Specifically designed for low-temperature, walk-in applications, Copeland Scroll ZF*KA compressors were designed for low-temperature, walk-in applications that also require smaller, fractional horsepower displacements. Not only are these units rated to meet EPA refrigerant requirements, they provide the needed efficiency improvements to help meet the DOE energy targets in the near future.

Copeland Scroll ZS*KA Compressors

The latest generation of Copeland Scroll ZS*KA compressors is optimized for medium-temperature applications and offers on average a 15 percent improvement in annual efficiency. Scroll technology delivers significant reliability gains due to 70 percent fewer moving parts and less operating fatigue than reciprocating hermetic compressors. A wide operating range and compatibility with acceptable refrigerants make the ZS*KA a flexible solution for many walk-in refrigeration needs.

Copeland Scroll ZS*KA compressor

For the most up-to-date information on Copeland products, download our Copeland Mobile app.

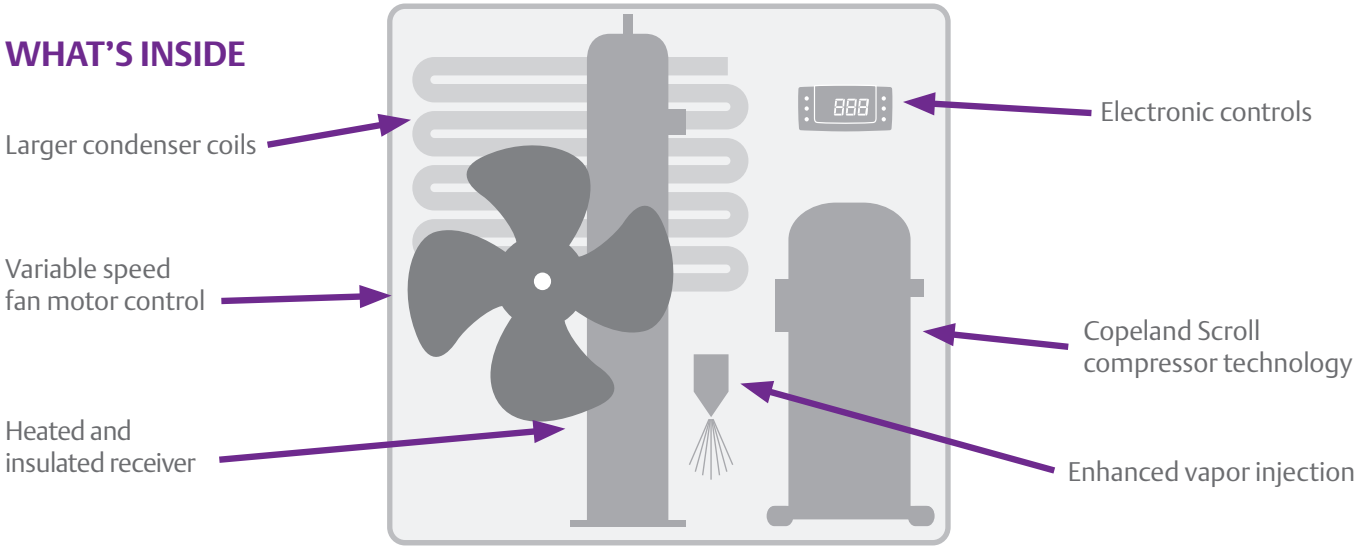
Moving the Condensing Unit Outdoors

The Copeland Scroll Outdoor Refrigeration Unit, X-Line Series is designed for medium- and low-temperature, walk-in coolers, freezers and display cases commonly found in c-stores and restaurants. With its best-in-class energy efficiencies, slim profile, ultra-low sound levels, superior diagnostics and built-in protection, the X-Line Series delivers reliable commercial refrigeration while solving many of today's small-format retailer challenges, including:

- Offsetting rising energy costs with new energy efficiency targets
- Reducing energy consumption to meet minimum efficiency levels
- Creating optimal in- and outside-store environments for customers and neighbors
- Identifying the potential for equipment failure in advance to prevent costly product loss
- Evaluating the critical role of refrigeration system architecture in total store energy usage

With its slim profile, lightweight design and wall-mount option, X-Line units give operators the flexibility to install them in the most space-constrained locations. This lowers installation costs and helps avoid expensive system design workarounds or relocation issues. Compared to legacy equipment and technology, the X-Line Series improves annual energy efficiencies by 20 percent.

WHAT'S INSIDE



▶ To learn more about outdoor condensing units, read our white paper at Emerson.com/CopelandOutdoorUnit.

Certified Copeland Compressors: Remanufactured Better Than the Original

Maintaining a Legacy of Reliability

When you need a replacement compressor, it's important to know exactly what you're getting. With the Certified Copeland compressor program, reliability is assured. To achieve the Certified Copeland compressor status, every compressor is put through a rigid process in which it is completely disassembled to the bare core, i.e., remanufactured from the ground up.

We test every essential component for operational integrity and replace all outdated and discontinued parts to meet Emerson's latest engineering and manufacturing guidelines. All in all, more than 500 parts are either replaced or upgraded. The end result is the most reliable remanufactured compressors in the world, from the most reliable remanufacturing process on the planet.

If you're letting an uncertified rebuilder perform this process, you're placing the reliability of the compressor at risk.

▶ Contact your Copeland authorized wholesaler to learn more about the benefits of a certified Copeland compressor.

Procedure	Certified Copeland compressors	Independent rebuilders' compressors
Ongoing design improvements	Yes 1. Super K/Discus™ compressors get new suction-reed valving, stainless steel reeds and positive-displacement oil pumps 2. Certain Discus models receive Delta Reed modifications to ensure extended life for demanding applications	No
Disassembly	100% disassembly, with the complete removal of all main bearings and internal valving	Partial disassembly, sometimes up to 100%, but normally only as needed to make visible repairs
Crankcase	All cylinder walls are air gauged to match Copeland specifications, and the crankcase is upgraded to current Emerson standards	Limited air gauging results in cylinder walls and crankcase being reworked to varying non-Emerson standards
Valve plates	Cleaned and/or reground to perfectly match Emerson specifications	Reused as received, with limited regrinding capabilities
Pistons	New aluminum pistons and rods	Salvaged discontinued cast-iron pistons with limited air gauging
Crankshaft	Completely cleaned, gauged, upgraded and polished to current Emerson specifications	Limited power-flushing and polishing equipment availability, with no upgrade to current Emerson specifications
Oil pump	Oil pumps are 100% disassembled, cleaned, gauged and retested to Emerson specifications; otherwise, they are replaced	Salvaged discontinued low-volume oil pumps with limited gauging and testing to ensure proper operation and efficiency
Stator and rotor	Stators are requalified to meet Emerson specifications	Stators are rewound to varying specs; reused stators may be discontinued models that have not been properly tested
Sourced components	All parts meet Emerson's latest engineering standards	None of the replacement parts are from Emerson; all are from independent dealers
Randomly conducted audit program	Yes — ensures compressor performance and reliability	No
Oil	Always charged through a metered system to meet Emerson specifications	Most often charged by sight
Electrical	Solid-state module is retested to Emerson specifications; the terminal box, wiring harness and terminal connectors are included	Limited retesting equipment availability with varying types of electrical parts, depending on the rebuilder
Final processing	Complete dehydration and final torquing of all external bolts; helium leak tested and performance tested to assure published performance	Variable dehydration tests and selective retorquing of bolts; limited performance testing to varying standards
UL recognized	Yes — all semi-hermetic models	No

The New Emerson Commercial and Residential Solutions

Emerson has boldly transformed itself to create value for our customers and innovate the solutions that will become their successes. We will continue to offer the technologies and services that keep homes and businesses running smoothly while creating comfortable, controllable environments with our energy-efficient HVACR solutions. Look to Emerson to solve the toughest industry challenges with our market-proven compressors, controls, thermostats and related equipment. Learn more at Emerson.com.

Emerson Climate Technologies is now part of the Emerson Commercial and Residential Solutions business platform. Leading product brands include: Copeland Scroll™, ProAct™, Sensi™, RIDGID® and InSinkErator®. Commercial and Residential Solutions offers a true solutions approach:

- Ensuring human comfort and health
- Protecting food quality and sustainability
- Advancing energy efficiency and environmental conservation
- Creating sustainable infrastructure
- Continuing momentum at The Helix Innovation Center

Emerson.com

EMERSON. CONSIDER IT SOLVED.™