



Natural Refrigerant Training Summit

Building a Sustainable Technician Workforce

■ March 19 - 21, 2024
Pittsburgh, PA



NORTH AMERICAN

Sustainable Refrigeration Council

Thank you for joining us at our Natural Refrigerant Training Summit!

This event is part of our larger workforce development program, which focuses on improving technician recruitment, training, and retention to grow the workforce and address the critical shortage of refrigeration technicians.

A vital pillar of the program is increasing training opportunities and preparing technicians to transition to climate-friendly refrigerants. We hope this event provides convenient, comprehensive, and relevant training to ensure your ongoing success today and in the future.

For more information about our workforce development initiative, visit nasrc.org/workforce-development.



The North American Sustainable Refrigeration Council (NASRC) is a 501(c)(3) environmental nonprofit working to advance climate-friendly natural refrigerants and reduce greenhouse gas emissions caused by traditional HFC refrigerants. We collaborate with stakeholders from across the industry, including over 55,000 food retail locations, to eliminate the barriers to natural refrigerants in supermarkets.

Thank you to our generous co-host

From all of us at NASRC, thank you to our co-host, Steamfitters 449, for providing their facility for the event.



Steamfitters Local 449 is affiliated with the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada. They provide high-quality apprenticeship training, benefits, and growth opportunities so their members can experience long, fulfilling careers. Local 449 members are highly trained craftsmen who fabricate, install and service piping systems.

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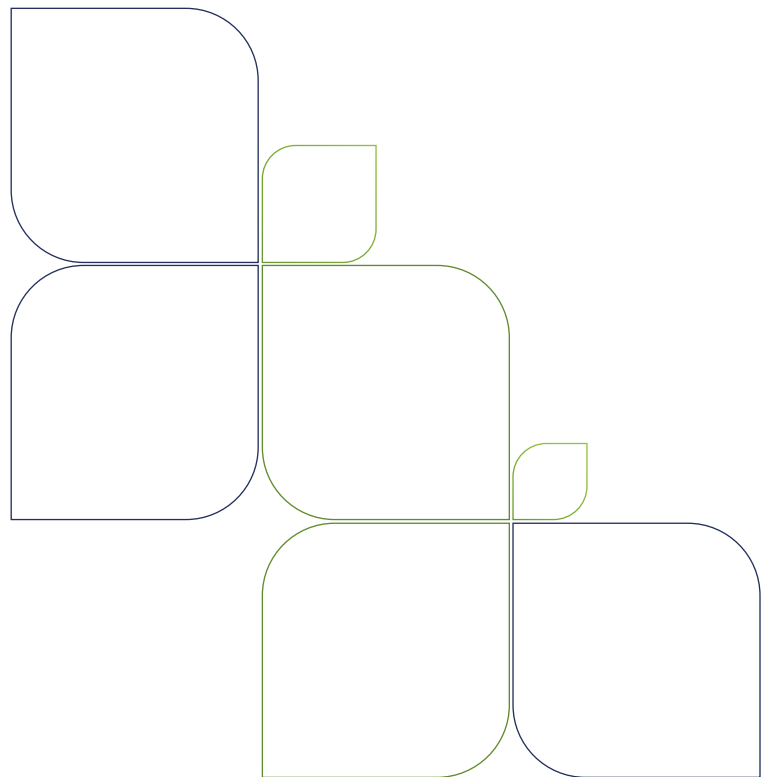
[@](#)
@NASRC

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Scan this QR code to access the agenda, session descriptions, hands-on training opportunities, facility map, and more.



Start	End	Training Provider	Session Title	Level	Topic	Room	
6:30 AM - 7:30 AM		REGISTRATION & BREAKFAST				EXPO HALL	
7:30 AM - 9:00 AM		BITZER	Introduction to CO2 Compressors and IQ MODULE	1	CO2	114	
		Parker Sporlan	CO2 Component and Case Control Overview	1	CO2	115	
		Copeland*	Piping & Instrumentation Diagram (P&ID) for CO2 Transcritical Booster Systems w/ Live Demo	1	CO2	120	
		AHT	R-290 Overview Including Micro Distributed Systems & Plug-In Units	1	Propane	121	
		Hussmann	CO2 Transcritical Operation: Why, How, and What's Next	1	CO2	103	
		Danfoss	CO2 Transcritical Systems and Controls	1	CO2	217	
		NASRC	Debunking CO2 Myths	1	CO2	218	
	Kysor Warren	Introduction to CO2 System Designs	1	CO2	222		
9:00 AM - 9:30 AM		BREAK				EXPO HALL	
9:30 AM - 11:00 AM		CAREL	Introduction to CO2 Rack Control	1	CO2	114	
		BAC	Understanding Adiabatic Cooling	1	CO2	115	
		Copeland*	Top 10 Differences Between HFC & CO2 Transcritical Booster Systems w/ On-Site CO2 System Demo	1	CO2	120	
		DORIN	CO2 Transcritical Compressors: Design and Troubleshooting	1	CO2	121	
		Hussmann	CO2 Evacuation, Charging, and Start-up Procedures	2	CO2	103	
		True Manufacturing	Introduction to Service and Maintenance of R-290 Commercial Ice Machines	1	Propane	217	
		NASRC	Understanding the Basics of Case Controllers	1	CO2	218	
	Kysor Warren	CO2 Installation, Maintenance, and Troubleshooting	2	CO2	222		
11:00 AM - 12:00 PM		LUNCH & EXHIBIT HALL				EXPO HALL	
12:00 PM - 1:30 PM		BITZER	Introduction to CO2 Compressors and IQ MODULE	1	CO2	114	
		Parker Sporlan	Micro Thermo CO2 Control Application	2	CO2	115	
		Copeland*	E3 Supervisory Controls w/ CO2 Applications & New CC200 Case Control	2	CO2	120	
		AHT	R-290 Overview Including Micro Distributed Systems & Plug-In Units	1	Propane	121	
		Refrigeration Mentor	Maximizing Earnings as a Refrigeration Service Technician	ALL	Strategy	103	
		Danfoss	CO2 Transcritical Systems and Controls	1	CO2	217	
		NASRC	Understanding Booster Oil Systems	1	CO2	218	
	Kysor Warren	Introduction to CO2 System Designs	1	CO2	222		
1:30 PM - 2:00 PM		BREAK				EXPO HALL	
2:00 PM - 3:30 PM		CAREL	Introduction to CO2 Valves and Their Control	1	CO2	114	
		BAC	Understanding Adiabatic Cooling	1	CO2	115	
		Copeland*	CO2 Climate Study, TCO Study, ESG Goals, and Controls Transition Plans for Food Retailers	ALL	CO2	120	
		DORIN	CO2 Transcritical Compressors: Design and Troubleshooting	1	CO2	121	
		RMS	Refrigerant Regulations and Compliance - Watchouts and Pitfalls	ALL	Regulations	103	
		True Manufacturing	Introduction to Service and Maintenance of R-290 Commercial Ice Machines	1	Propane	217	
		Zero Zone	CO2 Transcritical Systems: Focus on High-Pressure Expansion Valve Operation	1	CO2	218	
	Kysor Warren	CO2 Installation, Maintenance, and Troubleshooting	2	CO2	222		
3:30 PM - 5:00 PM		INDUSTRY NETWORKING & EXHIBIT HALL				EXPO HALL	

* Mobile training unit available

Level 1 Little-to-no expertise on topic **Level 2** Some prior training and limited field experience on topic **ALL** All levels

Wednesday, March 20

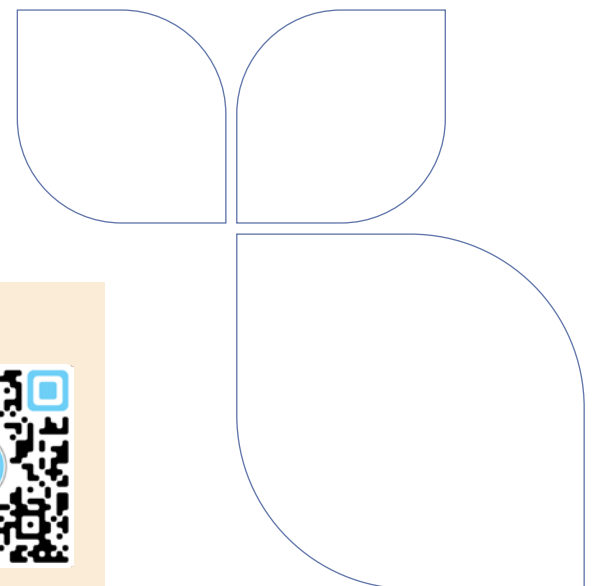
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3:30 PM	6:00 PM		HVACR STUDENT NETWORKING & EXHIBIT HALL			EXPO HALL

* Mobile training unit available

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7:30 AM - 7:50 AM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	
8:00 AM - 8:20 AM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	
8:30 AM - 8:50 AM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	
9:00 AM - 9:30 AM		BREAK			EXPO HALL	
		Zero Zone	CO2 Transcritical Systems: Focus on High Pressure Expansion Valve Operation	1	CO2	217
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10:00 AM - 10:20 AM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	
10:30 AM - 10:50 AM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	
11:00 AM - 12:00 PM		LUNCH & EXHIBIT HALL			EXPO HALL	
		Parker Sportan	Micro Thermo CO2 Control Application	2	CO2	217
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		RMS	Refrigerant Regulations and Compliance - Watchouts and Pitfalls	ALL	Regulations	222
12:00 PM - 12:20 PM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	
12:30 PM - 12:50 PM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	
1:00 PM - 1:20 PM		Various	20-minute hands-on breakout sessions* (sign-up required)	HANDS-ON	Various	

Level 1 Little-to-no expertise on topic
 Level 2 Some prior training and limited field experience on topic
 ALL All levels
 HANDS-ON Hands-on breakout session



*Hands-On Breakout Sessions

Sign up for 20-minute hands-on breakout sessions to level up your training! Space is limited and you must sign up at the Info Desk to secure your spot in the trainings. **Scan the QR code for more information** on the hands-on training opportunities and stop by the desk for more information.



Session Descriptions

AHT Cooling Systems USA: R-290 Overview Including Micro Distributed Systems & Plug-In Units

An overview of R-290 history, usage, design, installation, and service of R-290 micro distributed systems and controls. Review service, maintenance, troubleshooting, and controls of R-290 plug-in units.

Trainers: Andrew Lewins, Jason Courtney ■ **Propane (R-290)**

■ **Level 1**

📅 **March 19:** 7:30AM; 12:00PM | **March 20:** 7:30AM; 12:00PM

Baltimore Aircoil (BAC): Understanding Adiabatic Cooling

This training will help field service technicians understand how Adiabatic Condensers work and their benefits for CO2 systems. We'll also discuss Adiabatic Condenser components, operation, controls, tuning, and maintenance.

Trainer: Greg Martell ■ **CO2 (R-744)** ■ **Level 1**

📅 **March 19:** 9:30AM; 2:00PM | **March 20:** 9:30AM; 2:00PM

BITZER US: Introduction to CO2 Compressors and IQ MODULE

Learn how to use BITZER BEST Software to get a deeper understanding of how the compressor is operating. We'll cover options and accessories for the IQ module and CO2 compressors, minimum requirements, basic functionality, troubleshooting, and more.

Trainer: Miguel Boscan, Greg Krause ■ **CO2 (R-744)** ■ **Level 1**

📅 **March 19:** 7:30AM; 12:00PM | **March 20:** 7:30AM; 12:00PM

CAREL USA: Introduction to CO2 Rack Control

A basic overview of the CAREL CO2 rack controller: the pR300T. We'll explain the basics of the interface, review basic setup and parameter configurations, and cover the importance of proper installation and its direct impact on controller operation.

Trainer: Chris Butler ■ **CO2 (R-744)** ■ **Level 1**

📅 **March 19:** 9:30AM | **March 20:** 9:30AM | **March 21:** 7:30AM

CAREL USA: Introduction to CO2 Valves and Their Control

An introduction to CAREL valves, solenoids, and control methods, including the operation, installation, application, and servicing of CAREL valves and valve drivers, and how these interact with a CO2 refrigeration system.

Trainer: Chris Butler ■ **CO2 (R-744)** ■ **Level 1**

📅 **March 19:** 2:00PM | **March 20:** 2:00PM

Copeland*: Piping & Instrumentation Diagram (P&ID) for CO2 Transcritical Booster Systems w/ Live Demo

Learn about the piping layout of a CO2 transcritical booster system. The session will explain each system component, map flow direction, its purpose, and how it compares to a similar component used in HFC systems. Each major component shown on P&ID will also have an accompanying photo and demonstration from a CO2 TCB System operating on site. After class, students can physically see the mobile training unit with P&ID in hand for reference.

Trainer: Andre Patenaude ■ **CO2 (R-744)** ■ **Level 1**

📅 **March 19:** 7:30AM | **March 20:** 7:30AM

Copeland*: Top 10 Differences Between HFC & CO2 Transcritical Booster Systems w/ On-Site CO2 System Demo

Learn the ten key design considerations between CO2 and HFC systems, from secondary to cascade with an emphasis on transcritical booster systems. We'll cover gas cooler types and review subcritical and transcritical modes of operation, high-pressure concerns, pressure reliefs, where they occur, and how standstill pressures are mitigated during the off-cycle. The class will also cover critical and triple points of CO2 and the importance of effectively managing high-pressure and bypass gas valves to achieve system stability.

Trainer: Alain Mongrain ■ **CO2 (R-744)** ■ **Level 1**

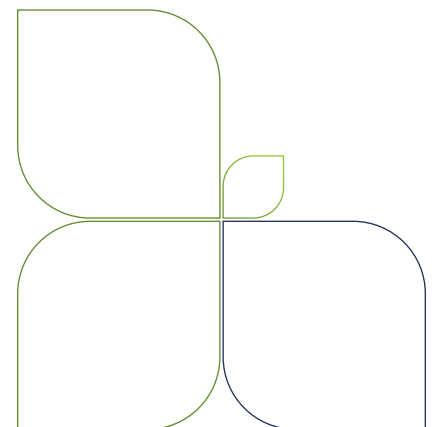
📅 **March 19:** 9:30AM | **March 20:** 9:30AM

Copeland*: E3 Supervisory Controls w/ CO2 Applications & New CC200 Case Control

An overview of the new E3 supervisory control with native CO2 applications vs. E2. We'll highlight the specific CO2 features that simplify start-up and troubleshooting. Learn about the new CC200 case control's simplified setup and flexibility and how both E3 & CC200 can leverage the new intuitive HMI via tablet, laptop, or mobile phone.

Trainer: Mike Hill, Brent Cheshire ■ **CO2 (R-744)** ■ **Level 2**

📅 **March 19:** 12:00PM | **March 20:** 12:00PM



Copeland*: CO2 Climate Study, TCO Study, ESG Goals, and Controls Transition Plans for Food Retailers

Copeland's CO2 Climate Study highlights the energy-saving benefits of the most common high ambient strategies across 13 US climate zones and 166 cities. The total cost of ownership study (TCO) compares eight architectures to a baseline R-448A centralized vs. CO2, R-290 micro distributed, and several others. The ESG information will review Copeland's commitment to science-based targets to achieve net zero and help retailers with their emission reduction targets. We'll also review an effective way of building a controls transition plan in your food retail operation.

Trainers: Andre Patenaude, Mike Hill ■ CO2 (R-744) ■ ALL Levels
 📅 **March 19:** 2:00PM | **March 20:** 2:00PM

Danfoss: CO2 Transcritical Systems and Controls

This session will cover CO2 properties, standard transcritical booster systems, EEVs, and parallel compressor systems. We will also cover the use of Multi Ejector Solutions in various applications.

Trainer: Steve Moss ■ CO2 (R-744) ■ Level 1
 📅 **March 19:** 7:30AM; 12:00PM | **March 20:** 7:30AM; 12:00PM | **March 21:** 9:30AM

DORIN USA: CO2 Transcritical Compressors: Design and Troubleshooting

A review of the important design criteria that must be considered for a transcritical CO2 compressor, highlighting the many challenges CO2 imposes from a compressor perspective. We'll describe our accelerated life testing, showing rigorous laboratory qualification and acceptance criteria and go over troubleshooting for common issues that may occur with CO2 compressors in the field. Class ends with a teardown of a CO2 compressor that explains what to look for in a field service call.

Trainers: Nabih Hussein, Mark Smith ■ CO2 (R-744) ■ Level 1
 📅 **March 19:** 9:30AM; 2:00PM | **March 20:** 9:30AM; 2:00PM

Hussmann: CO2 Transcritical Operation: Why, How, and What's Next

Training will cover why CO2 is being adopted, how CO2 systems differ from traditional refrigerants, and how traditional limitations are overcome.

Trainer: John Bento ■ CO2 (R-744) ■ Level 1
 📅 **March 19:** 7:30AM | **March 20:** 7:30AM | **March 21:** 7:30AM

Hussmann: CO2 Evacuation, Charging, and Start-up Procedures

A more technical overview of a transcritical CO2 system emphasizing evacuation, charging, and start-up procedures. Bring your questions!

Trainer: John Bento ■ CO2 (R-744) ■ Level 2
 📅 **March 19:** 9:30AM | **March 20:** 9:30AM | **March 21:** 12:00PM

Kysor Warren: Introduction to CO2 System Designs

Basic concept overview of CO2 systems and the technologies available to improve refrigeration system efficiency. This course covers basic principles, safety, and CO2 system design.

Trainer: Ignacio Chaparro ■ CO2 (R-744) ■ Level 1
 📅 **March 19:** 7:30AM; 12:00PM | **March 20:** 7:30AM; 12:00PM | **March 21:** 9:30AM

Kysor Warren: CO2 Installation, Maintenance, and Troubleshooting

Basics of CO2 systems installation, start-up, maintenance, and troubleshooting. This course covers display case setup, basic rack installation, startup, operation, maintenance, and troubleshooting of TC CO2. *This is part 2 of "An Introduction to CO2 System Designs."*

Trainer: Dale Sizemore ■ CO2 (R-744) ■ Level 2
 📅 **March 19:** 9:30AM; 2:00PM | **March 20:** 9:30AM; 2:00PM | **March 21:** 7:30AM

NASRC: Debunking CO2 Myths

This training will review and debunk some of the biggest myths about CO2 servicing and maintenance and explain the correct approach to optimizing and successfully operating CO2 transcritical booster systems. Open to retailers and technicians.

Trainer: Rusty Walker ■ CO2 (R-744) ■ Level 1
 📅 **March 19:** 7:30AM | **March 20:** 7:30AM

NASRC: Understanding the Basics of Case Controllers

Understand the basics of the many different case controllers and EEV used in modern CO2 and HFC/HFO rack systems. We will review a few of the different types of case controllers and manufacturers of these controllers. We will discuss the two different types of EEVs, troubleshooting tips, how to use a small oscilloscope, the different types of communication protocols (i.e. Modbus and BACnet), and the proper way to run and terminate our case controller network.

Trainer: Rusty Walker ■ CO2 (R-744) ■ Level 1
 📅 **March 19:** 9:30AM | **March 20:** 9:30AM

* Mobile training unit available

Session Descriptions

NASRC: Understanding Booster Oil Systems

This training prepares field service technicians for troubleshooting Booster oil issues by explaining how the Booster oil systems work. Topics covered include oil type use, some of the most frequent oil alarms and how to resolve them, and how often to perform preventive maintenance.

Trainer: Rusty Walker ■ CO2 (R-744) ■ Level 1

📅 **March 19:** 12:00PM

NASRC: Understanding and Troubleshooting the High-Pressure Control Valve and Flash Gas Bypass Valve

This training will explain how the high-pressure control and flash gas bypass valves operate and are controlled per specs. We'll discuss how to troubleshoot the HPCV, FGBV, and the controller if and when we have issues at 2:00AM.

Trainer: Rusty Walker ■ CO2 (R-744) ■ Level 1

📅 **March 20:** 12:00PM

Parker Sporlan/Micro Thermo: CO2 Component and Case Control Overview

An introduction to the concept of refrigeration with an overview of CO2 systems. The course will review CO2 system components, including the Gas Cooler/Flash Gas Bypass Valves, Electric Expansion Valves, solenoid valves, ball valves, and more. The course will also showcase the S3C Case Control as it performs as an integral part of the system to control evaporator temperature with the ability to remotely monitor and troubleshoot system conditions.

Trainer: Heath Schaefer ■ CO2 (R-744) ■ Level 1

📅 **March 19:** 7:30AM | **March 20:** 7:30AM

Parker Sporlan/Micro Thermo: CO2 Control Application

An overview of the Micro Thermo Alliance control platform, focusing on CO2 refrigeration control. Topics include MT Alliance's control schemes, data interpretation, advanced graphing, and Case Controller & Gas Cooler smart node interface set-up.

Trainer: Charles Cunliffe ■ CO2 (R-744) ■ Level 2

📅 **March 19:** 12:00PM | **March 20:** 12:00PM | **March 21:** 12:00PM

Refrigerant Management Solutions (RMS): Refrigerant Regulations and Compliance – Watchouts and Pitfalls

Compliance with federal, state, and local refrigerant regulations is a tag-team effort between food retail end-users and their service technicians. With new regulations coming out at least once a year now, the tag team is struggling to keep up. This training covers compliance with the latest federal and state refrigerant regulations, as well as watchouts and pitfalls for service technicians and food retail end-users.

Trainer: Keilly Witman ■ Regulations ■ ALL Levels

📅 **March 19:** 2:00PM | **March 20:** 2:00PM | **March 21:** 12:00PM

Refrigeration Mentor: Maximizing Earnings as a Refrigeration Service Technician

This presentation outlines strategies for refrigeration service technicians to boost their income by enhancing skills, delivering superior customer service, understanding business fundamentals, specializing in niche areas like supermarket refrigeration, and embracing technology like CO2. It covers continuous education, effective communication, business management, niche specialization, and the use of modern tools for efficiency.

Trainer: Trevor Matthews ■ Strategy ■ ALL Levels

📅 **March 19:** 12:00PM | **March 20:** 12:00PM

True Manufacturing: Introduction to Service and Maintenance of R-290 Commercial Ice Machines

An introduction to the service and maintenance of R-290 commercial ice machines, including an explanation of components and sequence of operations.

Trainer: Rich Boedeker ■ Propane (R-290) ■ Level 1

📅 **March 19:** 9:30AM; 2:00PM | **March 20:** 9:30AM; 2:00PM

Zero Zone: CO2 Transcritical Systems: Focus on High-Pressure Expansion Valve Operation

A brief overview of the transcritical CO2 system/properties. The session will include a description of the operation of the high-pressure expansion valve using the pressure enthalpy diagram, a review of various system architectures, and a discussion on operator safety.

Trainer: Bruce Hierlmeier ■ CO2 (R-744) ■ Level 1

📅 **March 19:** 2:00PM | **March 20:** 2:00PM | **March 21:** 9:30AM

* Mobile training unit available

Use this three-day overview to map out your personalized schedule.
Mark the classes you want to attend and get the most out of your training!

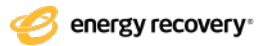
Training Provider	Session Title	Topic	March 19				March 20				March 21			
			7:30	9:30	12:00	2:00	7:30	9:30	12:00	2:00	7:30	9:30	12:00	
AHT	R-290 Overview Including Micro Distributed Systems & Plug-In Units	Propane	✓		✓		✓		✓					
BAC	Understanding Adiabatic Cooling	CO2		✓		✓		✓		✓				
BITZER	Introduction to CO2 Compressors and IQ MODULE	CO2	✓		✓		✓		✓					
CAREL	Introduction to CO2 Rack Control	CO2		✓				✓				✓		
CAREL	Introduction to CO2 Valves and Their Control	CO2				✓					✓			
Copeland*	Piping & Instrumentation Diagram (P&ID) for CO2 Transcritical Booster Systems w/ Live Demo	CO2	✓				✓							
Copeland*	Top 10 Differences Between HFC & CO2 Transcritical Booster Systems w/ On-Site CO2 System Demo	CO2		✓				✓						
Copeland*	E3 Supervisory Controls w/ CO2 Applications & New CC200 Case Control	CO2			✓				✓					
Copeland*	CO2 Climate Study, TCO Study, ESG Goals, and Controls Transition Plans for Food Retailers	CO2				✓					✓			
Danfoss	CO2 Transcritical Systems and Controls	CO2	✓		✓		✓		✓					
DORIN	CO2 Transcritical Compressors: Design and Troubleshooting	CO2		✓		✓		✓		✓				
Hussmann	CO2 Transcritical Operation: Why, How, and What's Next	CO2	✓				✓					✓		
Hussmann	CO2 Evacuation, Charging, and Start-up Procedures	CO2		✓				✓						✓
Kysor Warren	Introduction to CO2 System Designs	CO2	✓		✓		✓		✓				✓	
Kysor Warren	CO2 Installation, Maintenance, and Troubleshooting	CO2		✓		✓		✓		✓		✓		
NASRC	Debunking CO2 Myths	CO2	✓				✓							
NASRC	Understanding the Basics of Case Controllers	CO2		✓				✓						
NASRC	Understanding Booster Oil Systems	CO2			✓									
NASRC	Understanding and Troubleshooting the High-Pressure Control Valve and Flash Gas Bypass Valve	CO2							✓					
Parker Sporlan	CO2 Component and Case Control Overview	CO2	✓				✓							
Parker Sporlan	Micro Thermo CO2 Control Application	CO2			✓				✓					✓
RMS	Refrigerant Regulations and Compliance – Watchouts and Pitfalls	Regulations				✓					✓			✓
Refrigeration Mentor	Maximizing Earnings as a Refrigeration Service Technician	Strategy			✓				✓					
True Manufacturing	Introduction to Service and Maintenance of R-290 Commercial Ice Machines	Propane		✓		✓		✓		✓				
Zero Zone	CO2 Transcritical Systems: Focus on High-Pressure Expansion Valve Operation	CO2				✓				✓			✓	
Hands-on Breakout Sessions (20-minute blocks; see page 7 for details)												✓	✓	✓

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