

# **NATE CHP-5**

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The diagram illustrates the exam domains for the NATE CHP-5 Certified HVAC Professional. At the center is a circular icon labeled "CERTIFIED HVAC PROFESSIONAL". Surrounding this central icon are five colored circles, each representing an exam domain with its own icon and a list of topics:

- Service** (Wrench icon):
  - Concepts
  - Planned Maintenance
  - Repair and Replacement
  - Basic HVAC System Analysis
  - Cooling & Heating Diagnostics
- Installation** (House icon):
  - Concepts
  - Duct Fabrication & Installation
  - Installing Outdoor and Indoor Equipment
  - Evacuation and Charging
  - Fabricating Copper Tubing
  - Start-up and Checkout
- Electrical and Controls** (Lightning bolt icon):
  - Concepts
  - Controls
  - Wiring Layouts
  - Basic Electricity
  - Electrical Science Fundamentals
  - Diagnosis of Electrical Troubleshooting
- Comfort and Airflow** (Person icon):
  - Concepts
  - Airflow
  - Comfort
  - Air Balancing
  - Measuring Temperature and Humidity Measurements
- HVAC Fundamentals** (Downward arrow icon):
  - Concepts
  - Tools
  - Safety
  - Codes & Regulations
  - Basic Construction for HVAC Technicians
  - Basic Science and Heat Transfer

**CHP-5 EXAM DOMAINS**  
Technicians can take the exams in any order, and space each one to fit their schedule.

*If you have any questions, or if we can be of assistance:*

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# TABLE OF CONTENTS

## Domain: HVAC Fundamentals

10

### 109 Basic Hand and Power Tools (6 hours / Foundation)

*Written by James Eller*

- Installation Hand Tools - Sheet Metal and Piping
- Electronic and Power Tools
- L-03 Lesson: Introduction to Tools

### 101 HVAC Fundamentals (18 hours / Foundation)

*Written by Chris Compton*

- Measurements
- Heat Energy
- Pressure
- Gas Works
- Air Works
- Introduction to the Industry
- L-01 Lesson: Energy Terminology and Units of Measurements
- L-02 Lesson: Gas Laws

### 102 Safety (18 hours / Foundation)

*Written by Chris Compton*

- Labels, Materials Safety Data Sheets, and Safety Training
- Personal Protective Equipment (PPE)
- Personal Safety in Confined Spaces and on Ladders
- Fire Extinguishers and Compressed Gasses
- Electrical Lockout / Tagout
- Back Safety, Scaffolds/Lifts, and Fall Protection
- L-09 Lesson: Introduction to PPE

### 141 Refrigeration (18 hours / Intermediate)

*Written by Chris Compton*

- Basic Refrigeration Cycle Physics
- Condensation and Condensers
- Expansion and Metering Devices
- Evaporation and Evaporators
- Compression and Compressors
- Measure the Normal Cycle

**050 Applied Math** (12 hours / Foundation)

*Written by Chris Compton*

- Addition of Whole Numbers
- Subtraction of Whole Numbers
- Multiplication of Whole Numbers
- Division of Whole Numbers
- Addition of Common Fractions
- Subtraction of Common Fractions
- Multiplication of Common Fractions
- Division of Common Fractions
- Addition of Decimal Fractions
- Multiplication of Decimal Fractions
- Subtraction of Decimal Fractions
- Multiplication of Decimal Fractions
- Division of Decimal Fractions

**Gas Laws I** (1 hour)

**Introduction to Tools and Test Instruments** (1 hour)

**Introduction to Personal Protective Equipment (PPE)** (1 hour)

**Introduction to Refrigerant Tables** (1 hour)

**Domain: Electrical and Controls**

**13**

**111 HVACR Electrical DC Theory Plus** (18 hours / Foundation)

*Written by Chris Compton*

- Electrical Safety Fundamentals
- What is Energy
- Atomic Theory
- Basic Circuits
- Parallel Circuits
- Power

**112 HVACR Electrical AC Theory Plus** (18 hours / Intermediate)

*Written by Chris Compton*

- Magnetism
- Alternating Current
- Loads, Resistive and Inductive
- Capacitors
- Resistance
- Transformers

**113 HVACR Electrical Common Components** (18 hours / Advanced)

*Written by Chris Compton*

- Control Methods, Temperature & Pressure
- Residential Heat / Cool Thermostats @ Low Voltage
- Really Good Relay Stuff
- Contactors go / Starters go with protection
- Power wiring
- Odds and ends around a schematic

**114 HVACR Electrical Motors** (21 hours / Advanced)

*Written by Chris Compton*

- Basic Electric Motor Theory
- Open and Hermetic Motors
- Capacitor Motors
- Three-phase Motors
- The Application of Electric Motors
- Diagnosing and Replacing Electric Motors
- ECM Motors

**Energy Terminology and Units of Measurement** (1 hour)

**Series Circuits, Parallel Circuits and Power** (1 hour)

**Fundamentals of Alternating Current** (1 hour)

**Introduction to Transformers** (1 hour)

**Relays, Contactors and Starters** (1 hour)

**Understanding Electrical Schematics** (1 hour)

**Domain: Comfort and Airflow**

**16**

**121 HVACR Air Properties and Measurement** (18 hours / Intermediate)

*Written by Chris Compton*

- Heat Energy and Comfort
- Properties of Air
- Psychrometrics
- Total Heat In Air
- Measuring a Heavy Invisible Moving Volume
- Air Flow Measurement

**221 Indoor Air Quality Basics** (18 hours / Foundation)

*Written by John Kreiger and Chris Dorsi*

- IAQ Basics
- Properties of Air
- Air Flow Basics
- Ventilation
- Moisture Management
- Air Filtration

**239 HVACR Everything About Belts** (3 hours / Foundation)

**122 HVACR Systems: Load Calculations** (18 hours / Advanced)

- Fundamentals of Load Calculations
- Heat Loss of a Structure
- Heat Gain of a Structure
- Example Heat Loss and Heat Gain Calculation
- Fundamentals of Equipment Selection
- Regional Load Calculation Exercises

**123 Air Distribution** (18 hours / Advanced)

*Written by Phil Rains*

- Fundamentals of Air Flow
- Air Distribution Systems
- Fundamentals of Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D
- Application of Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D Duct Sizing Procedures
- Application of Air Conditioning Contractors of America (ACCA) Air Distribution Basics for Residential and Small Commercial Buildings, Manual T
- Selection and Sizing of Supply Air Outlets and Return Air Inlets using the ACCA Manual T and Air Distribution Equipment Manufacturer Performance Data for an Example Residential Structure

**Domain: Installation**

**18**

**106 Building Systems** (3 hours / Foundation)

*Written by Scott Oakley*

**110 Blueprints** (12 hours / Foundation)

- Intro to Blueprints
- Components of the Blueprint and Scale
- Lines of Construction, Abbreviations, Symbols, and Keynotes
- Using Gridlines to Identify Plan Locations and Dimensions

**104 Copper Works** (6 hours / Foundation)

*Written by Chris Compton*

- Copper Tubing/Pipe and Fittings (module exam)
- Cutting, Flaring, Swaging & Bending Tubing
- Torch Safety and Operation (module exam)
- Soft Solder
- Silphos Braze
- Silver Braze

**103 Basic Sheet Metal** (21 hours / Foundation)

*Written by Mark Clemons*

- Types of Sheet Metal and Their Uses
- Assembling, Connecting, and Fastening Sheet Metal Components
- Sheet Metal Tools and Their Uses
- Sealing, Insulating and Lining Sheet Metal Ductwork
- Specifications, Symbols, and Codes
- Introduction to Sheet Metal Duct Layout and Fabrication
- Methods of Layout and Development

**233 Fuel Gas Pipe Sizing** (1 hour)

**234 Fuel Gas Venting Systems** (1 hour)

**Domain: Service**

**20**

**133 HVACR Gas Heat I** (18 hours / Intermediate)

*Written by Bob Recko*

- Fuel Gas Composition
- Pressure Regulators, Burners, and Heat Exchangers
- Standing Pilot Systems
- Electronic Ignition
- High Efficiency Furnaces
- Troubleshooting Gas Burner Systems

**135 Heat Pumps** (21 hours / Advanced)

*Written by Phil Rains*

- What is a Heat Pump
- Heat Pump Installation and Quality Criteria
- The Heat Pump Cooling Mode
- The Heat Pump Heating Mode
- The Heat Pump Defrost Mode
- Heat Pump Components
- Heat Pump Troubleshooting

**137 HVACR Geothermal Heat Pump Systems (18 hours / Advanced)**

*Written by Phil Rains*

- Introduction to Geothermal Heat Pumps
- Geothermal Heat Pump Mechanics
- Ground-Water (Open-Loop) Systems
- Closed-Loop Systems
- Equipment Selection Criteria and Economics
- Installation Setup, Startup, and Troubleshooting

**139 Electric Heat (15 hours / Advanced)**

- Introduction to HVAC Electric Heat Systems
- Troubleshooting and Servicing Electric Furnaces I
- Troubleshooting and Servicing Electric Furnaces II
- Blower Motors and Troubleshooting Electrical
- Airflow, Using Ohm's Law – Intro Quiz Review

**142 Refrigeration II (18 hours / Advanced)**

- Refrigerants
- Common Compressor Accessories
- Common High-Side Accessories
- Common Low-Side Accessories
- Piping System Sizing
- Common System Control Arrangements

**239 HVACR Everything About Belts (3 hours / Foundation)**

**241 HVACR Intro to Cooling System Troubleshooting I (18 hours / Advanced)**

- Cooling System Service Overview
- Cooling Service Tools/Equipment, Safety, and Quality
- Cooling System Components
- Cooling System Air Flow
- Cooling System Electrical Troubleshooting Basics
- Cooling System Mechanical Troubleshooting Basics

**242 HVACR R-410A Refrigerant Technology (18 hours / Advanced)**

*Written by Phil Rains*

- R - 410A Refrigerant Background
- R - 410A Refrigerant Regulatory Requirements
- R - 410A Refrigerant Basics
- R - 410A Refrigerant Safety, Handling, and Service Equipment
- R - 410A System Components, Retrofitting, and Charging
- R - 410A System Operation and Troubleshooting



**243 HVACR Advanced Troubleshooting** (21 hours / Advanced)

Written by Chris Hickman, James Eller and Phil Rains

- Electrical Troubleshooting
  - Troubleshooting Controls
  - Troubleshooting Instrumentation
  - Troubleshooting Air Side
  - Troubleshooting Refrigeration
  - Troubleshooting Combustion
  - Troubleshooting Hydronics
- 

**Spanish Language Courses**

**23**

**Cursos básicos de HVAC en español**

- 101-S HVACR Principios Básicos
  - 111 -S HVACR Electricidad
  - 112-S HVACR Electricidad
  - 121-S HVACR Sistemas
  - 141-S HVACR Refrigeración
- 

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# HVAC FUNDAMENTALS

109

## 109 Basic Hand and Power Tools (6 hours / Foundation)

*Written by James Eller*

An introduction to the basic hand, power and specialty tools used daily by the working HVACR technician.

The topics discussed include Installation, Service and Troubleshooting Tools. Instruction aligns with ACCA Quality Installation & Maintenance Standards. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

### Modules cover:

- Installation Hand Tools - Sheet Metal and Piping
- Electronic and Power Tools-Relationships

101

## 101 HVAC Fundamentals (18 hours / Foundation)

*Written by Chris Compton*

An introduction to the HVACR basic fundamentals and terminology, and the applied physics concepts that are utilized in HVACR systems. Subjects include measurements, heat, pressure, gas properties, and air properties. Instruction aligns with ACCA Quality Installation & Maintenance Standards. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

### Modules cover:

- Measurements
- Heat Energy
- Pressure
- Gas Works
- Air Works
- Introduction to the Industry

102

## 102 Safety (18 hours / 60 days)

This course covers the basic safety considerations of the HVAC workplace. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180. This course is recognized for 18 hours of continuing education (CEHs) applicable to North American Technician Excellence (NATE) recertification.

### Expected End of Course Outcomes:

- Develop new work habits to increase your personal safety
- Identify electrical shock protection practices
- Learn to protect your back from unnecessary injury

### Modules cover:

- Labels, Materials Safety Data Sheets, and Safety Training
- Personal Protective Equipment (PPE)
- Personal Safety in Confined Spaces and on Ladders
- Fire Extinguishers and Compressed Gasses
- Electrical Lockout / Tagout
- Back Safety, Scaffolds/Lifts, and Fall Protection

**141****141 HVACR Refrigeration I** (18 hours / 60 days)

HVACR Refrigeration 141 provides a thorough examination of the refrigeration cycle as it is applied to both air conditioning and refrigeration purposes, and presents a practical and systematic method to diagnose problems in the refrigeration cycle. If you understand the parameters governing the operation of the refrigeration cycle, you will be able to diagnose any piece of equipment.

**Prerequisite:** It is recommended that you have a good understanding of HVACR Fundamentals, or have a working knowledge of them, prior to enrollment into this intermediate course. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Basic Refrigeration Cycle Physics
- Condensation and Condensers
- Expansion and Metering Devices
- Evaporation and Evaporators
- Compression and Compressors
- Measure the Normal Cycle

**050****050 HVACR Applied Math** (12 hours / 60 days)

A course designed to refresh and exercise common math concepts as applied to the HVACR workplace. This course provides demonstrations and exercises in the four basic math functions; addition, subtraction, multiplication and division. Each of the four functions is practiced using HVACR workplace applications. The course is offered without an instructor, but everything you need is included in the learning modules to refresh your working knowledge of basic math. Each of the four math functions are applied to:

- Whole numbers
- Fractions
- Decimals

Each module provides a tutorial that demonstrates how the specific process is performed and then followed with a selection of exercises to sharpen your skills. The correct answer is given after each of the exercise problems. The module is completed with a 10 randomly selected question exam. You will have 5 attempts at each exam to master math process assessed. Your highest score will be entered in your grade book.

**Modules cover:**

- Addition of Whole Numbers
- Subtraction of Whole Numbers
- Multiplication of Whole Numbers
- Division of Whole Numbers
- Addition of Common Fractions
- Subtraction of Common Fractions
- Multiplication of Common Fractions
- Division of Common Fractions
- Addition of Decimal Fractions
- Subtraction of Decimal Fractions
- Multiplication of Decimal Fractions
- Division of Decimal Fractions

**L****Gas Laws** (1 hour)

- Name the three gas law creators
- Explain the concepts of Temperature, Pressure, Volume
- State Charles Law for Constant Volume and Constant Pressure
- State Boyles Law and how it can be used for problems involving gases
- Use the General Gas Law to solve problems involving gases

**L****Introduction to Tools and Test Instruments** (1 hour)

- Learn about the major hazards from using worn or poorly maintained tools
- Important tips for proper use of hand tools
- Describes the precautionary measures for working with electric, battery operated, pneumatic, and gas-powered tools
- Learn how powder-actuated tools work and related safety precautions
- Learn how to maintain and work with test meters



## Introduction to Tools and Test Instruments (1 hour)

- Learn about the major hazards from using worn or poorly maintained tools
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- Describes the precautionary measures for working with electric, battery operated, pneumatic, and gas-powered tools
- Learn how powder-actuated tools work and related safety precautions
- Learn how to maintain and work with test meters



## Introduction to PPE (1 hour)

Personal Protective Equipment (PPE) is aimed at reducing employee exposure to workplace hazards, regulated by OSHA. In this lesson HVACR technicians will learn how to responsibly use PPEs to protect themselves and those around them.



## Introduction to Refrigerant Tables (1 hour)

Comprehensive review of Refrigerant Tables to help you:

- Comprehensive review of Refrigerant Tables to help you:
- Comprehensive review of Refrigerant Tables to help you
- Set pressure controls
- Check temperature according to pressure
- Compute correct head pressure for operating conditions
- Evaluate refrigerant capacities of cylinders and receivers
- Estimate compressor capacity
- Estimate normal discharge temperatures
- Calculate liquid density of refrigerants
- Calculate vapor density values
- Calculate net refrigeration effect
- Estimate normal discharge temperatures



# ELECTRICAL AND CONTROLS

111

## 111 HVACR Electrical DC Theory Plus (18 hours / 60 days)

An introduction to basic electrical theory such as the electron, Ohms Law, circuit schematic symbols, circuit characteristics and measurements as applied to DC & AC circuits in the HVACR industry. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols. This online course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. Students also receive access to the ESCO Electrical Theory and Application e-book, a downloadable file, as an additional learning resource.

### Modules cover:

- Electrical Safety Fundamentals
- What Is Energy
- Atomic Theory
- Basic Circuits
- Parallel Circuits
- Power

112

## 112 HVACR Electrical AC Theory Plus (18 hours / 60 days)

A continuation of the Electrical 111 course, concepts presented focus on alternating current production and application to devices utilized in HVACR systems. Topics include magnetism, alternating current, two types of loads, capacitors, and values of load devices and their calculations, and transformers. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. Also the ESCO Electrical Theory and Application e-book is included in the course as a downloadable file as an additional resource.

### Modules cover:

- Magnetism
- Alternating Current
- Loads, Resistive and Inductive
- Capacitors
- Resistance
- Transformers

**Recommended Prerequisites:** It is recommended that you have a good understanding of HVACR Fundamentals and Completion of 111 HVACR Electrical DC Theory Plus, or equivalent on the job training, prior to enrollment into this intermediate course.

113

## 113 HVACR Electrical Common Components (18 hours / 60 days)

A logical continuation of 112 Electrical, this course covers common control components found in HVACR systems. Presentations and examples are given for specific devices and their electrical sequence of operation in normal HVACR applications. The final modules discuss wiring and schematic reading. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

### Modules cover:

- Control Methods, Temperature & Pressure
- Residential Heat / Cool Thermostats at Low Voltage
- Really Good Relay Stuff
- Contractors / Starters with protection
- Power wiring
- Odds and Ends Around a Schematic

**Recommended Prerequisites:** you will want to have completed 111 HVACR Electrical DC Theory Plus, and 112 HVACR Electrical AC Theory Plus, or have a working knowledge of the content of those courses prior to enrollment into this advanced course. Please refer to each course description in the Catalog for the specific details. 113 Electrical is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. Students also receive access to the ESCO Electrical Theory and Application e-book, a downloadable file, as an additional learning resource.

**114**

## 114 HVACR Electrical Motors (21 hours / 60 days)

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This course is dedicated to common single-phase and small three-phase electric motors. Presentations focus on basic motor theory, common types of motors, starting components and protection devices. You will also develop diagnostic skills for motor troubleshooting and replacement. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites:** you will want to have completed 111 HVACR Electrical DC Theory Plus, 112 HVACR Electrical AC Theory Plus, and 113 HVACR Electrical Common Components, or have a working knowledge of the content of those courses prior to enrollment into this advanced course. Please refer to each course description in the Catalog for the specific details. This course is recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification. Students receive access to the ESCO Electrical Theory and Application e-book, a downloadable file, as an additional learning resource.

**Modules cover:**

- Basic Electric Motor Theory
- Open and Hermetic Motors
- Capacitor Motors
- Three-phase Motors
- The Application of Electric Motors
- Diagnosing and Replacing Electric Motors
- ECM Motors

**L**

## Energy Terminology and Units of Measurement (1 hour)

- Learn about the building blocks of matter and understand the relationship between atomic structure and electricity
- Learn about the various units of electrical measurements and their proper usage
- The relationships between the values of voltage, current, resistance and how they can be calculated mathematically

**L**

## Series Circuits, Parallel Circuits and Power (1 hour)

- The workings of a series circuit explained in detail
- The workings of a parallel circuit explained in detail
- The concept of power and its calculation for series and parallel circuits

**L**

## Fundamentals of Alternating Current (1 hour)

- Explain alternating current
- Describe sine waves
- Explain electrical frequency
- Define; Peak-to-peak, RMS, and Average Voltage Values
- Explain the sine wave relationships in resistive, inductive and capacitive circuits
- Calculate total current in a capacitive and inductive circuit

**L**

## Introduction to Transformers (1 hour)

- The construction of transformers, common faults, and how transformers are rated
- The workings, features, and testing of a residential type transformers
- Commercial transformers, multi-voltage, ratings, testing and determining current draw





## Relays, Contactors and Starters (1 hour)

- Explains the workings of relays
- Explains how to test pilot-duty relays
- Line-duty relay function, description of parts, and testing
- The workings of contactors, description of parts, and how to test
- Explanation of starters and potential relays and how to test
- Describes the features and testing procedures for current and time-delay relays



## Introduction to Understanding Electrical Schematics (1 hour)

- Describe how wiring diagrams work
- Identify different types of wiring diagrams used in HVACR
- List the five basic components to any schematic
- Identify the electrical symbols used in schematic diagrams and the components that they represent
- Identify and explain the difference between the “line” side and the “load” side
- Describe the different switch symbols used in schematic diagrams
- Identify the various machine functions depicted in a wiring diagram



## COMFORT AND AIRFLOW

121

### 121 HVACR Systems Air Properties and Measurement (18 hours / 60 days)

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Your introduction to HVAC comfort systems. In this course we discuss heat energy, the conditions of human comfort, the psychrometric chart and plotting various air conditions upon it. Included is the top-rated eBook on the topic entitled, "Psychrometrics Without Tears" to help you digest the important concepts of air and how the various properties relate to each other. We complete the course by introducing the terms, concepts, measurements, and calculations of moving air.

**Modules cover:**

- Heat Energy and Comfort
- Properties of Air
- Psychrometrics
- Total Heat In Air
- Measureing a Heavy Invisible Moving Volume
- Air Flow Measurement

**Recommended Prerequisites:** It is recommended that you have a good understanding of HVACR Fundamentals and have a working knowledge of those topics prior to enrollment into this intermediate course. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

221

### 221 HVACR Indoor Air Quality Basics (18 hours / 60 days)

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You already know it is your job to provide services related to the comfort of air temperatures inside your clients' buildings. However, temperature management is not the only thing you need to know. This course will help you better understand the various elements of air quality, introduce the science of air quality, and give you some tips on how to identify and address the potential dangers of poor indoor air quality. The course does not address issues of allergies or chemically sensitive clients outside the basics of indoor air quality. You will learn indoor air properties, air flow, ventilation, moisture, and air filtration systems. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Module topics cover:**

- IAQ Basics
- Properties of Air
- Air Flow Basics
- Ventilation
- Moisture Management
- Air Filtration

239

### 239 HVACR Everything About Belts (3 hours / 30 days)

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This is an entry-level course in a single module designed for those who need a basic understanding of drive belts and how they are utilized in residential and commercial HVACR systems. Types of drive belts, their selection, installation and maintenance are discussed in detail. The content of this course follows the recommended topics for basic study of HVACR. This course is NATE recognized for 3 hours of continuing education (CEHs) applicable to re-certification.



## 122 HVACR Systems: Load Calculations (18 hours / 60 days)

Residential load calculations is a method to determine the heating and cooling BTU/H loads of structures prior to installing HVACR systems to meet those loads. **You will need the required text:** Air Conditioning Contractors of America (ACCA) Manual J, 8th Abridged Edition (MJ8-AE). This manual provides thorough instructions for estimating heat loss and heat gain for residential structures and helps to simplify complicated procedures that are often used on a variety of home applications. 122 Systems provides instruction for completing load calculations by hand, which is necessary prior to attempting any computerized load program. We focus on following the concepts of MJ8-AE while further simplifying the methodology emphasized in the manual. Students will utilize a “simple” residential structure and follow the steps to calculate both heat loss and heat gain for its location and outdoor design temperatures. This course also covers residential equipment selection focused on the heating and cooling equipment Btu/h loads of a structure.

**Recommended Prerequisites:** You will want to have a strong working knowledge of HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

### Modules cover:

- Fundamentals of Load Calculations
- Heat Loss of a Structure
- Heat Gain of a Structure
- Example Heat Loss & Heat Gain Calculation
- Fundamentals of Equipment Selection
- Regional Load Calculation Exercises

## 123 HVACR Air Distribution (18 hours / 60 days)

123 Air Distribution begins with an in-depth discussion of the fundamentals of residential air flow, then turns the focus to residential duct design utilizing the Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D (required textbook) and ACCA Manual T (optional textbook). System selection, system performance characteristics, duct materials, blower performance, air –side devices and duct sizing procedures are covered in detail.

**Recommended Prerequisites:** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE recertification.

### Modules cover:

- Fundamentals of Air Flow
- Air Distribution Systems
- Fundamentals of Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D
- Application of Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D Duct Sizing Procedures
- Application of Air Conditioning Contractors of America (ACCA) Air Distribution Basics for Residential and Small Commercial Buildings, Manual T
- Selection and Sizing of Supply Air Outlets and Return Air Inlets using the ACCA Manual T and Air Distribution Equipment Manufacturer Performance Data for an Example Residential Structure



# INSTALLATION

106

## 106 HVACR Building Systems Review (3 hours / 30 days)

This is an entry-level course in a single module designed for those who need a basic understanding of residential building construction assemblies, terms and materials, as they pertain to HVACR installation and service work on a jobsite. The content of this course follows the recommended topics for basic study of HVACR. With this introductory course a student will have a better understanding of many of the basic building construction methods and materials. The content covered is keyed to the specified HVACR industry competency and curriculum guidelines published by several organizations concerned about education provided to HVACR technicians: NATE (North American Technician Excellence), ARI (Air-conditioning and Refrigeration Institute), ACCA (Air Conditioning Contractors of America). This course is NATE recognized for 3 hours of continuing education (CEHs) applicable to re-certification and RSES (Refrigeration Service Engineers Society).

110

## 110 HVACR Blueprints (12 hours / 60 days)

This online course provides an introduction to Blueprints used in construction specific to the heating, ventilation, and air conditioning systems that are likely to be found on the jobsite. HVACR Technicians need to understand how to read blueprints in order to perform their jobs and avoid errors. Subjects covered throughout this course include blueprint terms, symbols, interpretation and application of drawings; how to locate and identify the different components of a blueprint, scales of drawings, different measuring instruments; the meaning of different lines, markings, abbreviations, symbols, and keynotes; using gridlines to locate an area, caring for blueprints, and finally, how to measure for accuracy. This course is NATE recognized for 12 hours of continuing education (CEHs) applicable to NATE re-certification.

### Modules cover:

- Intro to Blueprints
- Components of the Blueprint & Scale
- Lines of Construction, Abbreviations, Symbols & Keynotes
- Using Gridlines to Identify Plan Locations & Dimensions

104

## 104 Copper Works (6 hours / 60 days)

Copper Works is different from all our other online courses because it was designed to provide specific guidance for students in a Copper Lab. It is rich with images and streaming videos that deliver the course content. There are two exams; one at the end of module 1, and the second at the end of module 3. If you are a technician who wants to improve your copper working skills without going to a classroom, this course is right for you. This course is recognized by NATE for 6 hours of continuing education (CEHs) applicable to re-certification.

### Modules cover:

- Copper Tubing/Pipe and Fittings
- Cutting, Flaring, Swaging & Bending Tubing
- Torch Safety and Operation
- Soft Solder
- Silphos Braze
- Silver Braze

**103****103 HVACR Basic Sheet Metal** (21 hours / 60 days)

This course will assist HVAC Technicians and others involved in the HVAC industry with a basic understanding of sheet metal. Sheet metal work is essential to HVAC work. An HVAC tech doing a furnace change out, for instance, will need to fit the new furnace to the plenum which may involve designing or building an adapter. The idea of taking a flat piece of metal and forming it into something useful, functional or decorative can be one of the most fascinating aspects of HVAC work. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 21 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Modules cover:**

- Types of Sheet Metal and Their Uses
- Assembling, Connecting, and Fastening Sheet Metal Components
- Sheet Metal Tools and Their Uses
- Sealing, Insulating and Lining Sheet Metal Ductwork
- Specifications, Symbols, and Codes
- Introduction to Sheet Metal Duct Layout and Fabrication
- Methods of Layout & Development

**233****233 Fuel Gas Pipe Sizing** (1 hour)

This video-based course uses the IFGC (International Fuel Gas Code) section for Fuel Gas pipe sizing. The video presentation presents the pertinent aspects of the IFGC for pipe sizing. Explains how to use the tables and charts that would be utilized for CH<sub>4</sub> (Natural Gas) and C<sub>3</sub>H<sub>8</sub> (Propane) in a residential or small commercial piping job. There are appropriate handouts and the course finishes with You sizing 4 piping systems and taking a final exam.

**234****234 Fuel Gas Venting Systems** (1 hour)

This course is an overview of venting for Categories I, II, IV fuel gas appliances. This course includes manufacturer's installation manuals for the three categories and other devices used in fuel gas venting systems.



## SERVICE

133

### 133 HVACR Gas Heat I (18 hours / 60 days)

This course provides knowledge and skills required to become a highly skilled technician who will install, maintain, and repair residential and small commercial Gas Heat Systems. We explore all the mechanical, electrical, and accessory devices commonly found in the modern Gas Heating Systems. With this knowledge, you will build troubleshooting skills and identify applicable codes as they pertain to the installation and use of these systems. Also extremely important is the focus on safety for the technician, the building, and its occupants.

**Recommended Prerequisites:** It is recommended that you have a good understanding of HVACR Fundamentals and have a working knowledge of those topics prior to enrollment into this intermediate course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

#### Modules cover:

- Fuel Gas Composition
- Pressure Regulators, Burners & Heat Exchangers
- Standing Pilot Systems
- Electronic Ignition
- High Efficiency Furnaces
- Troubleshooting Gas Burner Systems

135

### 135 HVACR Heat Pumps (21 hours / 60 days)

An introduction to reverse-cycle heat pumps used in residential and light commercial applications. The course covers components and operational differences of a heat pump vs. a straight air conditioning system, troubleshooting, and solutions. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites:** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification.

#### Modules cover:

- What is a Heat Pump?
- Heat Pump Installation & Quality Criteria
- The Heat Pump Cooling Mode
- The Heat Pump Heating Mode
- The Heat Pump Defrost Mode
- Heat Pump Components
- Heat Pump Troubleshooting

137

### 137 HVACR Geothermal Heat Pump Systems (18 hours / 60 days)

You will gain an introduction to geothermal heat pumps as one of the most efficient heating and cooling technologies available today. The course focuses on geothermal (water source) heat pumps utilized for residential and light commercial applications.

**Recommended Prerequisites:** You will want to have a strong working knowledge of basic HVACR fundamentals and a good understanding of the refrigeration cycle prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

#### Modules cover:

- Introduction to Geothermal Heat Pumps
- Geothermal Heat Pumps Mechanics
- Ground-Water (Open-Loop) Systems
- Closed-Loop Systems
- Equipment Selection Criteria & Economics
- Installation Setup, Startup & Troubleshooting

**139****139 HVACR Electric Heat** (15 hours / 60 days)

This online course provides an introduction and advanced training on the topic of Electric Heat and Electric Heating components relative to the HVAC systems that are likely to be found by a Technician in residential and light commercial applications. Subjects covered in this course include electric heat terms and identification of the basic components utilized, types of electric heat systems, as well as advanced theory and servicing of Electric Forced Air Furnaces.

**Prerequisite:** It is recommended that you have a good understanding of HVACR Fundamentals and Electrical, or have a strong working knowledge of those topics, prior to enrollment into this advanced course. This course is NATE recognized for 15 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Introduction to HVAC Electric Heat Systems
- Troubleshooting & Servicing Electric Furnaces I
- Troubleshooting & Servicing Electric Furnaces II
- Blower Motors & Troubleshooting Electrical
- Airflow Using Ohm's Law - Intro Quiz Review

**142****142 HVACR Refrigeration II** (18 hours / 60 days)

This course is a continuation and elaboration of HVACR Refrigeration I. Presentations describe the application of common accessories found in a system, piping arrangements, sizing considerations and system operation. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

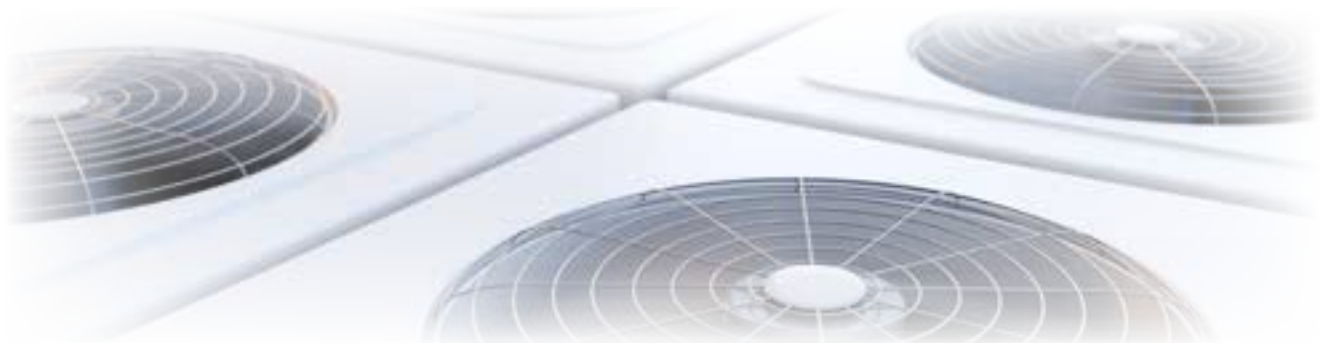
**Prerequisites:** You will want to have completed 141 HVACR Refrigeration I, or have a working knowledge of the content of that course prior to enrollment into this advanced course. Please refer to the 141 course description in the Catalog for specific details. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Refrigerants
- Common Compressor Accessories
- Common High-Side Accessories
- Common Low-Side Accessories
- Piping System Sizing
- Common System Control Arrangements

**239****239 HVACR Everything About Belts** (3 hours / 30 days)

This is an entry-level course in a single module designed for those who need a basic understanding of drive belts and how they are utilized in residential and commercial HVACR systems. Types of drive belts, their selection, installation and maintenance are discussed in detail. The content of this course follows the recommended topics for basic study of HVACR. This course is NATE recognized for 3 hours of continuing education (CEHs) applicable to re-certification.





**242**

## 242 HVACR R-410A Refrigerant Technology (18 hours / 60 days)

This R-410A Qualification course [you will receive a uniform patch and a wallet card for 75% or higher scores] is designed to familiarize the technician with the differences between R-22 and R-410A. Background, regulations, impact on the industry, and application requirements are presented. The course provides the technician with practical knowledge for safe performance of service techniques on systems containing R-410A. When you have successfully completed this course, you will receive a certificate of completion that complies with many equipment manufacturers' policies requiring safety and service "certification" prior to purchasing equipment containing R-410A refrigerant. Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

**Modules cover:**

- R - 410A Refrigerant Background
- R - 410A Refrigerant Regulatory Requirements
- R - 410A Refrigerant Basics
- R - 410A Refrigerant Safety, Handling & Service Equipment
- R - 410A System Components, Retrofitting, and Charging
- R - 410A System Operation & Troubleshooting

**Recommended Prerequisites:** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification. This course has been approved by International Comfort Products, LLC.

**243**

## 243 HVACR Advanced Troubleshooting (21 hours / 60 days)

This comprehensive course will help technicians move through a procedure to follow safety guidelines, identify the source of problems in HVACR systems, use diagnostic tools, and to address the problem properly. Often technicians start their investigation with only the customer's call, "It died yesterday!" Instruction aligns with ACCA Quality Installation and ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Electrical Troubleshooting
- Troubleshooting Controls
- Troubleshooting Instrumentation
- Troubleshooting Air Side
- Troubleshooting Refrigeration
- Troubleshooting Combustion
- Troubleshooting Hydronics



101

### 101 HVACR Principios Básicos (18 horas/60 días)

Este curso en línea ofrece una introducción a los fundamentos básicos y la terminología de HVACR. El contenido del curso se dedica a aplicar conceptos físicos que se utilizan en sistemas de HVACR. Se tratan los temas de las mediciones, el calor, la presión, y las propiedades del gas y del aire. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento, e incluye tutoriales de RSES. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.

**Módulos incluyen:**

- Mediciones
- Energía Térmica
- Presión
- Propiedades de Gas
- Propiedades de aire
- Introducción a la industria HVACR

111

### 111 HVACR Electricidad - Teoría y más de la corriente (18 horas / 60 días)

Este curso en línea es una introducción a la teoría eléctrica, como el electrón, la ley de Ohm, los símbolos del esquema del circuito, las características del circuito y las medidas que se aplican a los circuitos CC Y CA en la industria HVACR. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento, e incluye tutoriales de RSES. Este curso en línea es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.

**Módulos incluyen:**

- Fundamentos de la seguridad eléctrica
- ¿Qué es la energía?
- Teoría atómica
- Circuitos básicos
- Circuitos en paralelo
- Potencia

112

### 112 HVACR Electricidad – Teoría y más de corriente alterna

(18 horas / 60 días)

Una continuación en línea del curso 111 Electricidad, los conceptos que se presentan y analizan son orientados a la producción de la corriente alterna y su aplicación a los dispositivos utilizados en sistemas de HVACR. Cubriremos el magnetismo, la corriente alterna, dos tipos de cargas, los condensadores, y los valores de los dispositivos de carga y sus cálculos, además de los transformadores. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento, e incluye tutoriales de RSES.

**Módulos incluyen:**

- Magnetismo
- Corriente alterna
- Cargas resistivas e inductivas
- Condensadores
- Resistencia
- Transformadores

**Curso Previo Recomendado:** Se recomienda que tenga un buen conocimiento de los fundamentos de la teoría de corriente continua como lo tratado en el curso 111, o entrenamiento en el trabajo antes de hacer este curso. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.



**121**

## 121 HVACR Sistemas - propiedades y medición del aire (18 horas / 60 días)

Este curso en línea es la introducción de sistemas de confort de HVAC. En este curso trataremos la energía térmica, las condiciones de confort humano, el gráfico de la psicrometría y el trazado de diversas condiciones de aire. Vamos a completar el curso con la introducción de los términos, conceptos, mediciones y cálculos del aire en movimiento. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento.

**Curso Previo Recomendado:** Se recomienda que tenga un buen conocimiento de los fundamentos básicos de HVACR, o entrenamiento en el trabajo antes de hacer este curso. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.

### Módulos incluyen:

- Energía térmica y confort
- Propiedades del Aire
- Psicrometría
- Calor total del aire
- Medir un pesado volumen invisible en movimiento
- Medición del caudal de aire

**141**

## 141 HVACR Refrigeración I (18 horas / 60 días)

141 HVACR Refrigeración se ha diseñado para proporcionar un análisis exhaustivo del circuito de refrigerante, ya que se aplica a ambos aire acondicionado y refrigeración, y para proporcionar un método práctico y sistemático para el diagnóstico de problemas en el circuito de refrigerante. Si entiende los parámetros que rigen el funcionamiento del circuito de fluido refrigerante, será capaz de diagnosticar cualquier tipo de equipo. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento.

**Curso Previo Recomendado:** Se recomienda que tenga un buen conocimiento de los fundamentos básicos de HVACR, o entrenamiento en el trabajo antes de hacer este curso. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE

### Módulos incluyen:

- Física básica del ciclo de refrigeración
- Condensación y condensadores
- Dispositivos de expansión y medición
- Evaporación y evaporadores
- Compresión y compresores
- Medir el ciclo normal





# **NATE CHP-5**

## **CERTIFICATION PREP**

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