

## HVAC-R III

03301-08 Refrigerants and Oils (10 Hours) Covers characteristics and applications of the current generation of refrigerants, including both pure and blended refrigerants. Also provides extensive coverage of lubricating oils used in refrigeration systems.

03302-08 Compressors (15 Hours) Explains the operating principles of the different types of compressors used in comfort air conditioning and refrigeration systems, along with basic installation, service, and repair procedures for these compressors.

03303-08 Metering Devices (7.5 Hours) Covers the operating principles, applications, installation, and adjustment of the various types of fixed and adjustable expansion devices used in air conditioning equipment.

03304-08 Retail Refrigeration Systems (20 Hours) Introduces the product refrigeration components and systems, such as the reach-in coolers and freezers commonly used in markets.

03305-08 Commercial Hydronic Systems (12.5 Hours) Covers the various types of boilers, components, and piping systems used in commercial heating applications. Also introduces chilled water systems and their components.

03306-08 Steam Systems (10 Hours) Covers operating principles, piping systems, components, and preventive maintenance requirements of steam systems and steam traps.

03307-08 Planned Maintenance (20 Hours) Describes the purpose of planned maintenance and outlines the procedures for servicing gas and oil furnaces, electric heating equipment, cooling equipment, and heat pumps.

03308-08 Water Treatment (10 Hours) Covers the kinds of water problems encountered in heating and cooling systems and identifies various water treatment methods and equipment.

03309-08 Troubleshooting Electronic Controls (7.5 Hours) Explains how to analyze circuit diagrams for electronic and microprocessor-based controls used in comfort heating and cooling equipment and how to troubleshoot systems that use these controls.

03310-08 Troubleshooting Oil Heating (10 Hours) Covers how to identify the common causes of problems in oil furnaces and offers hands-on experience in isolating and correcting oil furnace malfunctions.

03311-08 Troubleshooting Heat Pumps (12.5 Hours) Reviews heat pump operation and heat pump control circuits, including how to isolate and correct faults in the heating, cooling, auxiliary heat, and defrost functions of heat pumps.

03312-08 Troubleshooting Accessories (10 Hours) Provides hands-on lab sessions on how to troubleshoot humidifiers, electronic air cleaners, economizers, zone controls, and heat recovery ventilators.

## HVAC-R IV

03401-08 Construction Drawings and Specifications (25 Hours) Students learn to interpret the various drawings used in commercial construction, including mechanical drawings, specifications, shop drawings, and as-builts and to perform takeoff procedures for equipment, fittings, ductwork and other components.

03402-08 Air System Balancing (20 Hours) This module teaches the students about air properties and gas laws, as well as the use of psychrometric charts. It covers the tools, instruments, and methods used in balancing an air distribution system.

03403-08 Indoor Air Quality (15 Hours) Defines the issues associated with indoor air quality and its affect on the health and comfort of building occupants. Provides guidelines for performing an IAQ survey and covers the equipment and methods used to monitor and control indoor air quality.

03404-08 Energy Conservation Equipment (10 Hours) This module covers the various heat recovery/reclaim devices, along with other energy recovery equipment used to reduce energy consumption in HVAC systems.

03405-08 Building Management Systems (17.5 Hours) Explains how computers and microprocessors are used to manage zoned HVAC systems. This module has been updated to reflect new system architecture, advances in network protocols and systems controllers, and communication via Internet and wireless.

03406-08 System Startup and Shutdown (22.5 Hours) This module covers procedures for the startup of hot water, steam heating, chilled water, and forced-air distribution systems. Emphasis is on startup after initial equipment installation or after an extended period of shutdown. Includes procedures for preparing these systems for extended shutdown.

03407-08 Heating and Cooling System Design (25 Hours) Identifies and explains the factors that affect heating and cooling loads, describes the process by which heating and cooling loads are calculated, and shows how load calculations are used in the selection of heating and cooling equipment. Covers types of duct systems and their selection, sizing, and installation requirements.

03408-08 Commercial and Industrial Refrigeration Systems (22.5 Hours) This module expands the study of product and process refrigeration begun in Level 3. It deals with the type of systems used in cold storage and food processing facilities, as well as transportation refrigeration.

03409-08 Alternative Heating and Cooling Systems (10 Hours) This new module deals with the wide variety of alternative devices that are used to reduce energy consumption, including wood, coal, and pellet-fired systems, waste-oil heaters, geothermal heat pumps, solar heating, in-floor radiant heating, and direct-fired makeup units.

03410-08 Introduction to Supervisory Skills (12.5 Hours) Along with the principles of project planning, scheduling, and estimating, this module teaches the basic skills required for supervising personnel.



# Heating Ventilation Air Conditioning & Refrigeration

## I – IV



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# HVAC-R I

00101-09 Basic Safety (12.5 Hours) Complies with OSHA-10 training requirements. Explains the safety obligations of workers, supervisors, and managers to ensure a safe workplace. Discusses the causes and results of accidents and the impact of accident costs. Defines safe work procedures, proper use of personal protective equipment, and working with hazardous chemicals. Identifies other potential construction hazards, including hazardous material exposures, welding and cutting hazards and confined spaces.

00102-09 Introduction to Construction Math (10 Hours) Reviews basic mathematical functions and explains their applications to the construction trades. Explains how to use and read various length measurement tools, including standard and metric rulers and tape measures, and the architect's and engineer's scales. Explains decimal-fraction conversions and the metric system, using practical examples. Also reviews basic geometry as applied to common shapes and forms.

00103-09 Introduction to Hand Tools (10 Hours) Introduces trainees to hand tools that are widely used in the construction industry, such as hammers, saws, levels, pullers, and clamps. Explains the specific applications of each tool and shows how to use them properly. Also discusses important safety and maintenance issues related to hand tools.

00104-09 Introduction to Power Tools (10 Hours) Provides detailed descriptions of commonly used power tools, such as drills, saws, grinders, and sanders. Reviews applications, proper use, safety, and maintenance. Many illustrations show power tools used in on-the-job settings.

00105-09 Introduction to Construction Drawings (10 Hours) Familiarizes trainees with basic terms for construction drawings, components, and symbols. Explains the different types of drawings (civil, architectural, structural, mechanical, plumbing/piping, electrical, and fire protection) and instructs trainees on how to interpret and use drawing dimensions. Four oversized drawings are included.

00106-09 Basic Rigging (15 Elective Hours) Explains how ropes, chains, hoists, loaders, and cranes are used to move material and equipment from one location to another on a job site. Describes inspection techniques and load-handling safety practices. Also reviews American National Standards Institute (ANSI) hand signals.

00107-09 Basic Communication Skills (7.5 Hours) Provides trainees with techniques for communicating effectively with co-workers and supervisors. Includes practical examples that emphasize the importance of verbal and written information and instructions on the job. Also discusses effective telephone and e-mail communication skills.

00108-09 Basic Employability Skills (7.5 Hours) Identifies the roles of individuals and companies in the construction industry. Introduces trainees to critical thinking and problem solving skills and computer systems and their industry applications. Also reviews effective relationship skills, effective self-presentation, and key workplace issues such as sexual harassment, stress, and substance abuse.

00109-09 Introduction to Materials Handling (5 Hours) Recognizes hazards associated with materials handling and explains proper materials handling techniques and procedures. Also introduces materials handling equipment, and identifies appropriate equipment for common job-site tasks.

03101-07 Introduction to HVAC (7.5 Hours) Covers the basic principles of heating, ventilating, and air conditioning, career opportunities in HVAC, and apprenticeship programs.

03102-07 Trade Mathematics (10 Hours) Explains how to solve problems involving the measurement of lines, area, volume, weights, angles, pressure, vacuum, and temperature. Also introduces scientific notation, powers, roots, and basic algebra and geometry.

03103-07 Copper and Plastic Piping Practices (5 Hours) Covers the selection, preparation, joining, and support of copper and plastic piping and fittings.

03104-07 Soldering and Brazing (7.5 Hours) Covers tools, materials, and safety precautions and depicts step-by-step procedures for soldering and brazing piping.

03105-07 Ferrous Metal Piping Practices (5 Hours) Covers various types of iron and steel pipe and fittings, and provides step-by-step instructions for cutting, threading, and joining ferrous piping.

03106-07 Basic Electricity (12.5 Hours) Teaches power generation and distribution, electrical components, DC circuits, and electrical safety.

03107-07 Introduction to Cooling (30 Hours) Covers the basic principles of heat transfer, refrigeration, and pressure-temperature relationships and describes the components and accessories used in air conditioning systems.

03108-07 Introduction to Heating (15 Hours) Covers heating fundamentals, types and designs of furnaces and their components, and basic procedures for installing and servicing furnaces.

03109-07 Air Distribution Systems (10 Hours) Describes air distribution systems and their components, air flow measurement, ductwork installation principles, and the use of instruments for measuring temperature, humidity, pressure, and velocity.

# HVAC-R II

03201-07 Commercial Airside Systems (12.5 Hours) Describes the systems, equipment, and operating sequences used in a variety of commercial airside system configurations, such as constant volume single-zone and multi-zone, VVT, VAV, and dual-duct VAV.

03202-07 Chimneys, Vents and Flues (5 Hours) Covers the principles of venting fossil-fuel furnaces and the proper methods for selecting and installing vent systems for gas-fired heating equipment.

03203-07 Introduction to Hydronic Systems (10 Hours) Introduces hot water heating systems, focusing on safe operation of the low-pressure boilers and piping systems commonly used in residential applications.

The Barr Construction Institute school admits students of any race, sex, color, religion, national or ethnic origin to all the rights, privileges, programs, activities, admission policies, education policies, scholarships and loan programs generally accorded or made to students at the school. All are encouraged to apply. ABC is an Equal Opportunity/Affirmative Action employer.

03204-07 Air Quality Equipment (5 Hours) Covers the basic principles, processes, and devices used to control humidity and air clean-lines, as well as devices used to conserve energy in HVAC systems.

03205-07 Leak Detection, Evacuation, Recovery, and Charging (20 Hours) Covers the basic refrigerant handling and equipment servicing procedures to service HVAC systems in an environmentally safe manner.

03206-07 Alternating Current (7.5 Hours) Covers transformers, single-phase and three-phase power distribution, capacitors, the theory and operation of induction motors, and the instruments and techniques used in testing AC circuits and components. Also reviews electrical safety.

03207-07 Basic Electronics (5 Hours) Explains the theory of solid-state electronics, as well as the operation, use, and testing of the various electronic components used in HVAC equipment. Includes an introduction to computers.

03208-07 Introduction to Control Circuit Troubleshooting (30 Hours) Covers the operation, testing, and adjustment of conventional and electronic thermostats, as well as the operation of common electrical, electronic, and pneumatic circuits used to control HVAC systems. Also explains how to analyze circuit diagrams for electronic and microprocessor-based controls used in comfort heating and cooling equipment and how to troubleshoot systems that use these controls.

03209-07 Troubleshooting Gas Heating (12.5 Hours) Covers tools, instruments, and techniques used in troubleshooting gas heating appliances, including how to isolate and correct faults.

03210-07 Troubleshooting Cooling (20 Hours) Covers the basic techniques and equipment used in troubleshooting cooling equipment, focusing on analyzing system temperatures and pressures in order to isolate faults.

03211-07 Heat Pumps (20 Hours) Covers the principles of reverse cycle heating, describes the operation of the various types of heat pumps, and describes how to analyze heat pump control circuits. Includes heat pump installation and service procedures.

03212-07 Basic Installation and Maintenance Practices (17.5 Hours) Covers the application and installation of various types of fasteners, gaskets, seals, and lubricants, as well as the installation and adjustment of different types of belt drives, bearings, and couplings. Includes job documentation and customer relations.

03213-07 Sheet Metal Duct Systems (5 Hours) Covers layout, fabrication, installation, and insulating sheet metal ductwork. Also includes selection and installation of registers, diffusers, dampers, and other duct accessories.

03214-07 Fiberglass and Flexible Duct Systems (5 Hours) Covers the layout, fabrication, installation, and joining of fiberglass ductwork and fittings. Describes the proper methods for attaching and supporting flex duct.