HVAC-R III

03313-13 Fasteners, Hardware and Wiring Terminations (10 Hours) Covers a variety of fasteners, hardware and wiring terminations used in HVAC systems including the installation of these components.

03314-13 Control Circuit and Motor Troubleshooting (30 Hours) Introduces the product refrigeration components and systems, such as the reach-in coolers and freezers commonly used in markets.

03210-13 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.

*03311-13 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.

03209-13 Troubleshooting Gas Heating (12.5 Hours) Covers tools, instruments, and techniques used in troubleshooting gas heating appliances, including how to isolate and correct faults.

03310-13 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.

03312-13 Troubleshooting Accessories (10 Hours) Provides hands-on lab sessions on how to troubleshoot humidifiers, electronic air cleaners, economizers, zone controls, and heat recovery ventilators.

03315-13 Zoning, Ductless and Variable Refrigerant Flow Systems(12.5 Hours) Introduces the information and skills needed to troubleshoot and repair zoned, ductless and variable refrigerant flow systems.

03305-13 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.

03306-13 Steam Systems (10 Hours) Covers operating principles, piping systems, components, and preventive maintenance requirements of steam systems and steam traps.

03304-13 Retail Refrigeration Systems (20 Hours) Introduces the product refrigeration components and systems, such as the reach-in coolers and freezers commonly used in markets.

03316-13 Customer Relations (5 Hours) Covers operating principles, piping systems, components, and preventive maintenance requirements of steam systems and steam traps.

HVAC-R IV

03308-13 Water Treatment (10 Hours) Covers the kinds of water problems encountered in heating and cooling systems and identifies various water treatment methods and equipment.

03403-13 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.

03404-13 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.

03405-13 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.

03402-13 System Air 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.

03406-13 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.

03401-13 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.

03407-13 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.

03408-13 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.

03409-13 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.

03410-09 Fundamentals of Crew Leadership (12.5 Hours)

Barr CONSTRUCTION INSTITUTE

Heating Ventilation Air Conditioning & Refrigeration

I – IV

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HVAC-R I

00101-15 Basic Safety (12.5 Hours) Presents basic jobsite safety information to prepare workers for the construction environment. Describes the common causes of workplace incidents and accidents and how to avoid them. Introduces common PPE, including equipment required for work at height, and its proper use. Information related to safety in several specific environments, including welding areas and confined spaces.

00102-15 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.

00103-15 Introduction to Hand Tools (10 Hours) Introduces common 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.

00104-15 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.

00105-15 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.

00106-15 Basic Rigging (15 Elective Hours) Explains how ropes, chains, hoists, loaders, and cranes are used 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.

00107-15 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.

00108-15 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.

00109-15 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.

03101-13 Intro. to HVAC (7.5 Hours) Covers the basic principles of heating, ventilating, and air conditioning, career opportunities in HVAC, and how apprenticeship programs are constructed. Basic safety principles, as well as trade licensure and EPA guidelines, are also introduced.

03102-13 Trade Mathematics (10 Hours) Explains how to solve HVAC/R trade related problems involving the measurement of lines, area, volume, weights, angles, pressure, vacuum, and temperature. Also includes a review of scientific notation, powers, roots, and basic algebra and geometry.

03106-13 Basic Electricity (12.5 Hours) Introduces the concept of power generation and distribution, common electrical components, AC and DC circuits, and electrical safety as it relates to the HVAC field. Introduces reading and interpreting wiring diagrams.

03108-13 Introduction to Heating (15 Hours) Covers the fundamentals of heating systems and the combustion process. The different types and designs of gas furnaces and their components, as well as basic procedures for their installation and service, is provided.

03107-13 Introduction to Cooling (30 Hours) Explains the fundamental operating concepts of the refrigeration cycle and identifies both primary and secondary components found in typical HVAC/R systems. Common refrigerants are introduced as well. Describes the principles of heat transfer and the essential pressure temperature relationships of refrigerants. Basic control concepts for simple systems are also introduced.

03109-13 Air Distribution Systems (15 Hours) Describes the factors related to air movement and its measurement in common air distribution systems. The required mechanical equipment and materials used to create air distribution systems are also presented. Basic system design principles for both hot and cold climates are introduced.

03103-13Basic Copper and Plastic Piping Practices (10 Hours) Explains how to identify types of copper tubing and fittings used in the HVAC/R industry and how they are mechanically joined. The identification and application of various types of plastic piping, along with their common assembly and installation practices, are also presented.

03104-13 Soldering and Brazing (10 Hours) Introduces the equipment, techniques, and materials used to safely join copper tubing through both soldering and brazing. The required PPE, preparation, and work processes are covered in detail. The procedures for brazing copper to dissimilar materials are also provided.

03105-13 Basic Carbon Steel Piping Practices (10 Hours) Explains how to identify various carbon steel piping materials and fittings. The joining and installation of threaded and grooved carbon steel piping systems is covered, with detailed coverage of threading and grooving techniques included.

HVAC-R II

03206-13 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.

03302-13 Compressors (15 Hours) Explains the operating principles of various compressors used in comfort air conditioning and refrigeration systems, along with basic installation, service, and repair procedures for these compressors.

03301-13 Refrigerants and Oils (10 Hours) Covers characteristics and applications of the current refrigerants, including both pure and blended refrigerants. Also provides coverage of lubricating oils used in refrigeration systems.

03205-13 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.

03303-13 Metering Devices (7.5 Hours) Covers the operating principles, applications, installation, and adjustment of the various fixed and adjustable expansion devices used in A/C.

03211-13 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.

03215-13 Basic Maintenance (10 Hours) Describes common tasks associated with basic maintenance. Specific tasks, such as lubrication and belt installation are reviewed in detail. Provides detailed coverage on maintenance inspections of gas furnaces and common cooling/heat pump systems.

03202-13 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.

03213-13 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.

03214-13 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.

03201-13 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.

03204-13 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.

03203-13 Intro. to Hydronic Systems (10 Hours) Introduces hot water heating systems and safe operation of the low-pressure boilers and piping systems commonly used in residential applications.