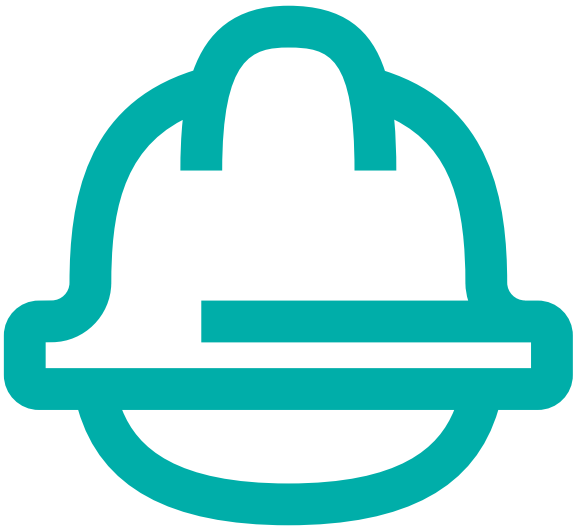
NOCTI

Teacher Credential Blueprint



HVAC Maintenance Technology

Code: 5937 / Version: 01

General Assessment Information

Blueprint Contents

Test Type: The HVAC Maintenance Technology assessment is included in NOCTI's Teacher assessment battery. Teacher assessments measure an individual's technical knowledge and skills in a proctored proficiency examination format. These assessments are used in a large number of states as part of the teacher licensing and/or certification process, assessing competency in all aspects of a particular industry. NOCTI Teacher tests typically offer both a written and performance component that must be administered at a NOCTI-approved Area Test Center. Teacher assessments can be delivered in an online or paper/pencil format.

Revision Team: The assessment content is based on input from subject matter experts representing the state of Pennsylvania.

CIP Code

46.0415- Building Construction Technology

Learning that works for America CTE™

Career Cluster 2- Architecture and Construction

o*net™ in*it

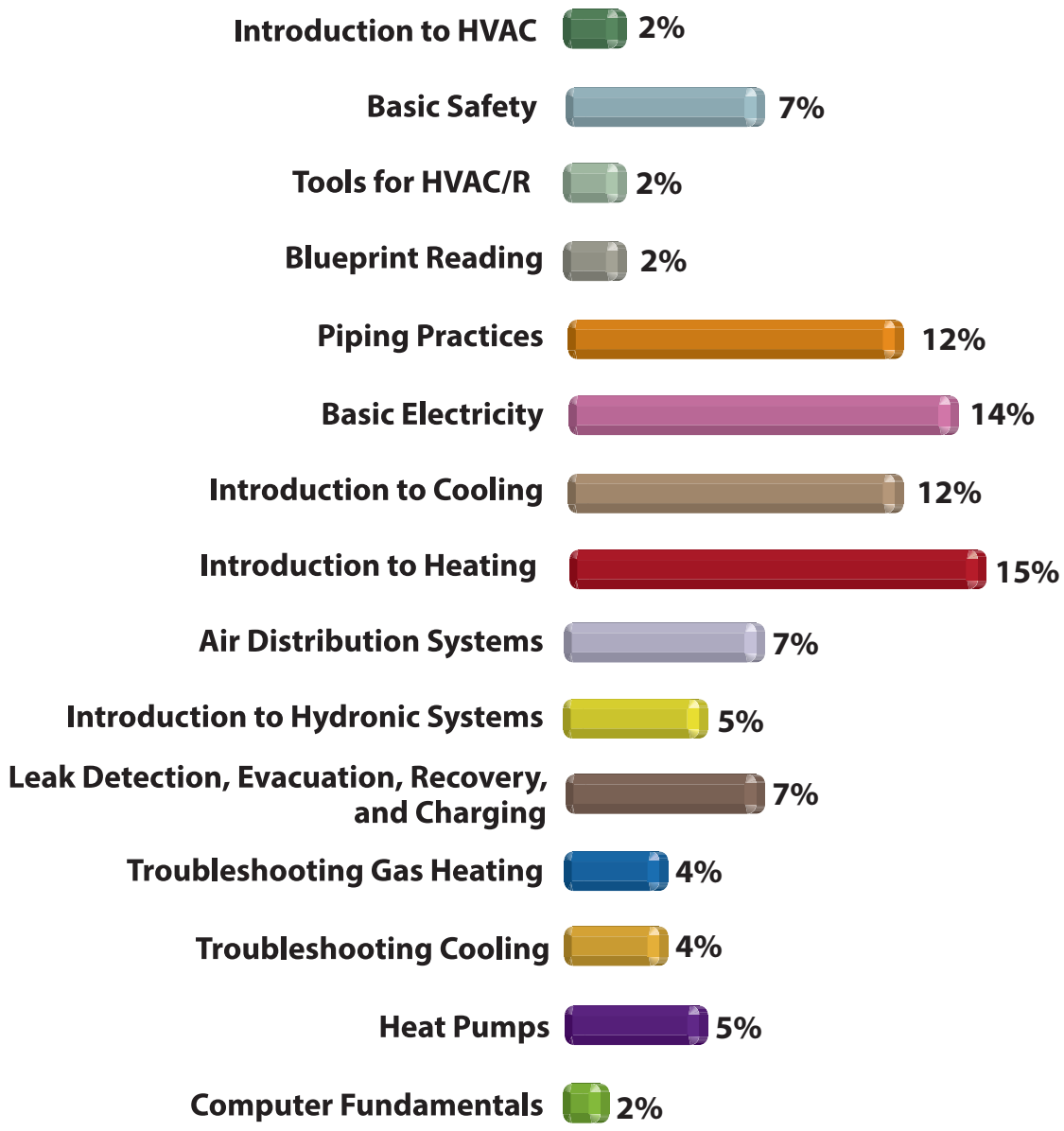
47-2031.01- Construction Carpenters

Written Assessment

NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

Administration Time: 3 hours
Number of Questions: 194
Number of Sessions: This assessment may be administered in one, two, or three sessions.

Areas Covered



Specific Standards and Competencies Included in this Assessment

Introduction to HVAC

- Identify HVAC systems
- Demonstrate awareness of occupational requirements

Basic Safety

- Identify causes of jobsite accidents and measures to prevent them
- Identify jobsite hazards and describe measures to prevent them from occurring
- Identify and demonstrate the use of personal protective equipment
- Demonstrate the knowledge of OSHA regulations

Tools for HVAC/R

- Identify and safely use basic hand tools used in the trade
- Identify and safely use basic power tools used in the trade

Blueprint Reading

- Identify types of blueprint plans
- Read and interpret blueprint plans

Piping Practices

- Select, measure, cut, and ream piping and tubing
- Assemble piping projects and pressure test according to trade standards
- Identify and assemble PVC pipe and fittings
- Assemble copper tubing projects and pressure test according to trade standards
- Solder copper tubing
- Braze and silver solder ACR tubing
- Identify and demonstrate proper use of fittings and tools for steel (black) pipe
- Assemble corrugated stainless steel gas tubing (CSST) projects
- Identify piping material such as PVC, ABS, copper, black iron

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Specific Standards and Competencies (continued)

Basic Electricity

- Calculate basic electrical quantities using Ohm's Law
- Recognize and draw various types of electrical schematics and symbols
- Demonstrate electrical testing to include mechanical/electronic relays
- Wire series circuit, parallel circuit, and series/parallel circuit
- Install electric disconnects, circuit breakers, and fuses
- Identify and test capacitors
- Identify electrical motors and their applications
- Recognize motor control protection and start devices
- Demonstrate knowledge of transformers and their applications

Introduction to Cooling

- Measure temperature and pressure of a cooling system
- Calculate superheat and subcooling
- Locate and describe components of the basic refrigeration cycle
- Apply pressure temperature charts for various refrigerants
- Describe the functions of compressors
- Describe the functions of condensers
- Describe the functions of evaporators
- Describe the functions of metering devices
- Evaluate effects of airflow on system performance

Introduction to Heating

- Describe the principles of combustion
- Identify temperatures and pressures of a heating system
- Identify components of various heating systems
- Perform maintenance on a gas furnace
- Troubleshoot conventional/condensing gas heating equipment
- Identify oil heating equipment
- Install and adjust oil fired equipment
- Perform annual preventive maintenance on oil fired equipment
- Troubleshoot oil fired equipment
- Identify electric heating equipment
- Install heating/air conditioning thermostats according to manufacturer's standards
- Perform combustion analysis on oil and gas fired equipment

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Specific Standards and Competencies (continued)

Air Distribution Systems

- Identify and describe the different types of duct system components
- Measure temperature, humidity, and air velocities
- Determine velocity, static, and total air pressures in a system
- Perform basic duct fabrication functions

Introduction to Hydronic Systems

- Describe hot water heating system components
- Install and service hydronic systems

Leak Detection, Evacuation, Recovery, and Charging

- Locate refrigerant leaks using common types of leak detectors
- Perform refrigerant recovery
- Perform system evacuation and dehydration
- Determine when to charge with liquid versus vapor
- Weigh in correct system charge (when appropriate)

Troubleshooting Gas Heating

- Perform gas burner flame proving tests according to trade standards
- Demonstrate how to install, troubleshoot, and service gas heating equipment

Troubleshooting Cooling

- Identify control system components
- Demonstrate, install, troubleshoot, and service cooling equipment

Heat Pumps

- Explain heat pump modes of operation
- Identify and describe heat pump components
- Demonstrate how to install heat pumps

Computer Fundamentals

- Identify and demonstrate skills with computer software relating to HVAC

Sample Questions

When using a ladder around electrical lines, the worker should

A. make sure the ladder has a good base
B. use wooden stand-offs
C. not use a metal ladder
D. wrap the ladder in rags

What is capillary attraction when soldering or brazing?

A. when the filler metal flows away from the heat
B. when the capillary tube is connected to the suction line
C. when the filler metal flows toward the heat
D. when hot fluid metal rises only to the top of the pipe

The purpose of a step-down transformer is to

A. decrease secondary current
B. increase the current for the control circuit
C. decrease secondary voltage
D. reduce voltage for control circuit safety

Incomplete combustion results from a lack of

A. fuel
B. oxygen
C. carbon monoxide
D. carbon dioxide

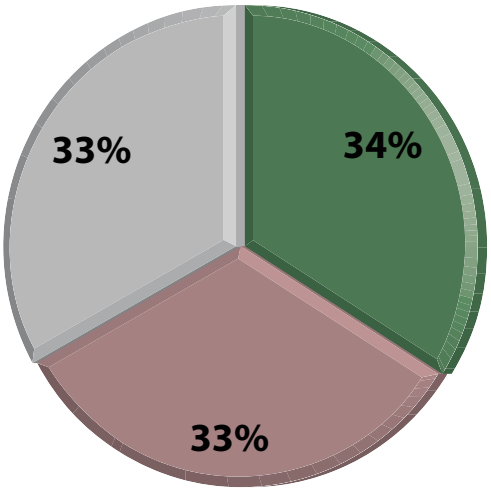
A hydronic zone-control valve is actuated by the

A. temperature of water
B. circulator
C. thermostat
D. pressure of water

Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

Administration Time: 3 hours
Number of Jobs: 3



Areas Covered:

34% Brazing or Soldering
Participant will use safety considerations to flare and braze or solder using a torch. Assemble pieces according to figure shown and absence of leaks.

33% Refrigerant Recovery
Participant will calibrate manifold gauges, install and remove gauges properly and safely. Purge manifold gauge hoses, adjust/position service valves to read pressures. Recover and replace the correct amount of refrigerant and complete System Conditions Sheet for Job 2.

33% Gas Furnace Start-Up and Check-Out
Participant will test, verify, and adjust manifold gas pressure. Leak test gas connections, check electrical connections, measure and record unit supply voltage. Install thermostat, start equipment, test and adjust burner manifold pressure. Test temperature rise, check fan motor amperage draw, perform steady-state efficiency test, and calculate unit CFM.

Sample Job

Refrigerant Recovery

Maximum Time: 60 minutes

Participant Activity: Participant will secure the required materials, tools, and equipment, adjust manifold gauges, install gauges properly and safely, purge manifold gauge hoses using the de minimis rule, adjust/position service valves to read pressures or other pertinent conditions, recover the refrigerant using the recovery unit and cylinder, utilizing the vapor recovery method, complete the System Conditions Sheet, turn the system on, and return the refrigerant.