NOCTI

Job Ready Pilot Blueprint

Pilot Assessment

Content is Subject To Change Prior to Full Implementation



HVAC - Heating, Ventilation, and Air Conditioning - Pilot

Code: 3145 / Version: 01

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JOB READY ASSESSMENT BLUEPRINT

HVAC

HEATING, VENTILATION, AND AIR CONDITIONING - PILOT

Test Code: 3145
Version: 1

Specific Competencies and Skills Tested in this Assessment:

Electricity
Identify basic electrical components
Demonstrate understanding of multimeters and multimeter use
Identify electrical symbols and diagrams
Demonstrate knowledge of thermostat installation methods

Soldering, Brazing, Welding, and Pipefitting
Demonstrate understanding of types of soldering, brazing, solder, and alloys for tubing and fittings
Demonstrate knowledge of the use of nitrogen when brazing and leak checking
Identify various types of piping, fittings, valves, and their application

Related Math
Convert British Thermal Units (BTUs)
Convert temperatures and pressures
Display knowledge of common field measurements

Refrigeration and Air Conditioning
Demonstrate understanding of how to evacuate a refrigeration system
Demonstrate understanding of how to charge a refrigeration system
Calculate and interpret superheat and subcooling
Display understanding of how to establish accepted running conditions
Identify refrigeration cycle components and their functions

General Safety
Demonstrate knowledge of Personal Protective Equipment (PPE) and safety
Demonstrate knowledge of HVAC-specific safety procedures and hazards
Demonstrate knowledge of HVAC standards

HVAC - Heating, Ventilation, and Air Conditioning - PILOT (continued)

Employability Skills
Demonstrate understanding of resumé and job interview skills
Demonstrate knowledge of effective communication skills
Demonstrate understanding of professionalism and ethics

Heat Pumps and Electric Heat
Demonstrate understanding of the components and sequence of defrost used on heat pumps
Demonstrate understanding of electric furnaces and emergency and auxiliary heat
Identify types of heat pumps and heat pump components
Demonstrate understanding of establishing running parameters for heat pumps

Gas and Oil Units
Explain theory of operation
Identify furnace components and their function
Demonstrate understanding of flue installation materials and operation
Demonstrate knowledge of how to identify and document conditions that lead to an unsafe appliance

Tools
Demonstrate knowledge of common hand tools
Demonstrate knowledge of common power tools
Demonstrate knowledge of tools of the trade

Written Assessment:

Administration Time: 2 hours and 30 minutes
Number of Questions: 132

Areas Covered:

10% Electricity
8% Soldering, Brazing, Welding, and Pipefitting
10% Related Math
13% Refrigeration and Air Conditioning
15% General Safety
7% Employability Skills
9% Heat Pumps and Electric Heat
10% Gas and Oil Units
18% Tools

Sample Questions:

The power supply lines are represented by what in a ladder diagram?
A. individual system components
B. control voltage transformer
C. path of the refrigerant
D. vertical lines on the side

A check valve is installed on a hydronic heating system to prevent
A. backflow
B. water hammer
C. heat loss
D. pressure buildup

A distance of 4 feet is the recommendation for the base of an extension ladder when accessing a _____ rooftop.
A. 10-foot
B. 12-foot
C. 14-foot
D. 16-foot

Reducing time during an evacuation is an advantage of using
A. pressure gauges and sealant
B. leak detectors and recovery cylinders
C. core-removal tools and large-diameter, vacuum-rated hoses
D. refrigerant scales and small-diameter charging hoses

Double-insulated tools should be used when working on
A. plumbing systems
B. live electrical circuits
C. HVAC ductwork
D. low-pressure gas lines

An individual's full name is typically included at the top of a/an
A. meeting agenda
B. expense report
C. resumé
D. interview checklist

The efficiency rating of 80 percent is usually which type of heating system?
A. gas boiler
B. heat pump
C. electric furnace
D. dual fuel radiator

Rejecting absorbed heat to the outside air is the role of the _____ during the refrigeration cycle.
A. expansion valve
B. evaporator coil
C. compressor
D. condenser coil

A psychrometer is used to measure
A. air pressure
B. wind speed
C. relative humidity
D. temperature gradient

Gas pressure is measured using a
A. hygrometer
B. psychrometer
C. manometer
D. barometer

Performance Assessment:

Administration Time: 2 hours and 15 minutes
Number of Jobs: 6

Areas Covered:

13% **Measure and Adjust Gas Pressure on a Furnace**

Participant will use a manometer to check gas supply pressure at the inlet of a gas valve and manifold pressure at the outlet of the gas valve before adjusting manifold pressure according to equipment and gas specifications.

18% **Brazing with Nitrogen**

Participant will shape and cut a section of copper tubing with two bends, reconnect the pieces, flare and attach one end, sweep with nitrogen, braze the joints, and verify all connections before cleanup and evaluator notification.

17% **Analyze Gauge Readings**

Participant will identify the type of refrigerant used in the system and connect manifold gauges, record the low- and high-side pressure readings, record the saturation temperature readings, measure and calculate superheat and subcooling, and disconnect gauges and hoses before cleanup and evaluator notification.

18% **Recovery and Evacuation of a System**

Participant will demonstrate setup for refrigerant recovery and system evacuation by selecting the right tools, connecting equipment properly, notifying the evaluator, and disassembling the equipment.

19% **Utilize Functions of a Multimeter**

Participant will measure the resistance/ohms across an open/closed switch and across a load; capacitance microfarad across a dual run capacitor; DC voltage across a 9 V battery; supply voltage to a circuit; potential difference across an open/closed switch and across a load; and amperage on circuit before cleanup and evaluator notification.

15% **Wire and Program a Thermostat**

Participant will set up and connect tools for thermostat installation by mounting the base, wiring for a 1H/1C application, and programming the settings before evaluator notification, resetting the unit, and cleanup.

Sample Job: Measure and Adjust Pressure on a Furnace

Maximum Job Time: 20 minutes

Participant Activity: Participant will use a manometer to check both the gas supply pressure at the inlet of a gas valve and the manifold pressure at the outlet of the gas valve before adjusting the manifold pressure according to equipment and gas specifications. After notifying the evaluator when they are finished, the participant will safely remove the manometer, return the equipment to its proper location, and clean the work area.