



## General Assessment Information

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**Test Type:** This Residential Construction Academy certification assessment is a customized assessment for the Home Builders Institute. This assessment measures technical skills at the occupational level and includes items which gauge factual and theoretical knowledge. This assessment offers both a written and performance component and can be used at the secondary level and post-secondary level. This assessment can be delivered in an online or paper/pencil format.

**Revision Team:** The assessment content is based on input from secondary, post-secondary, and business/industry representatives from the state of California, Florida, Indiana, Michigan, Mississippi, New York, North Dakota, Texas, Virginia, and Washington.



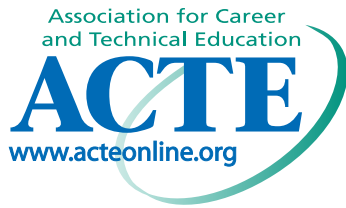
47.0201 – Heating, Air Conditioning,  
Ventilation and Refrigeration  
Maintenance Technology/Technician



Career Cluster 1 - Architecture  
and Construction



49-9021.01 – Heating and Air  
Conditioning Mechanics  
and Installers



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!



Home Builders Institute (HBI), an affiliate of the National Association of Home Builders (NAHB), is a national leader for career training in the building industry. HBI's educational materials are designed to be relevant in today's rapidly changing environment, bringing increased professionalism, competency and effectiveness to those entering the residential construction workforce.

HBI/NAHB assessments are based on national skill standards set by NAHB industry professionals and educators as are the materials contained in the Residential Construction Academy Series. Participants passing the assessments are eligible for certification through HBI/NAHB at the entry, semi-skilled or skilled levels.

## Written Assessment

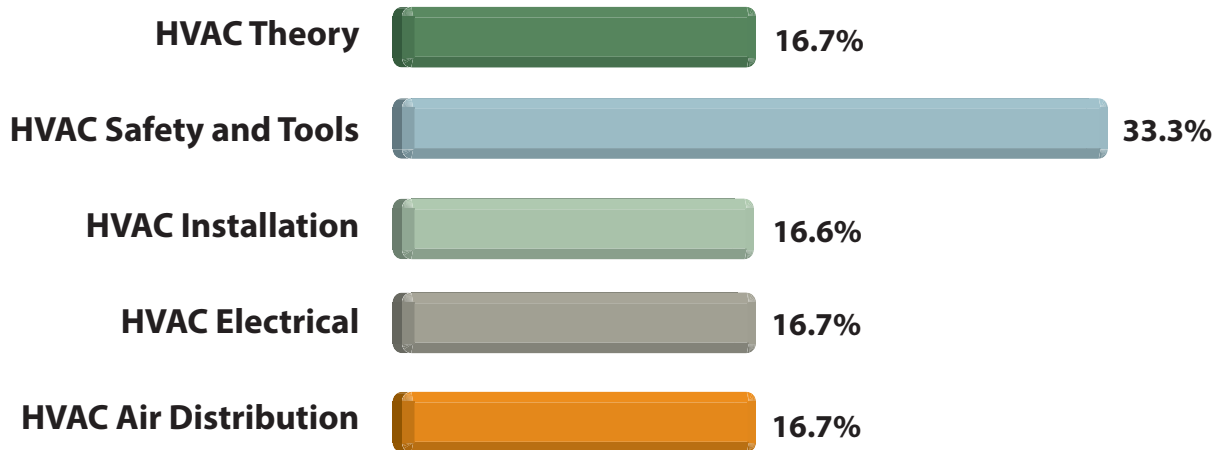
This written assessment consists of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 50 minutes

**Number of Questions:** 60

**Number of Sessions:** This assessment may be administered in one session.

### Areas Covered



## Specific Competencies and Skills Tested in This Assessment

### **HVAC Theory**

- Heat Theory and Refrigeration

### **HVAC Safety and Tools**

- Safety and Tools

### **HVAC Installation**

- Electric, Gas, Oil, Hydronic, Heat Pump, and Geothermal Installation

### **HVAC Electrical**

- Controls, Motors, and Troubleshooting

### **HVAC Air Distribution**

- Air Treatment and Installation



## Sample Questions

**Which of these components is primarily responsible for absorbing heat from a space?**

- A. Evaporator
- B. Condenser
- C. Compressor
- D. Air handler

**What is the color of a ground wire on HVAC equipment?**

- A. White
- B. Green
- C. Black
- D. Red

**In which of these ignition methods is the pilot light lit all the time?**

- A. Direct spark
- B. Intermittent pilot
- C. Standing pilot
- D. Hot surface ignition

**A single phase motor has which of these windings?**

- A. Run
- B. Start
- C. Run and start
- D. Common

**Which of these are used for pleated air filters?**

- A. Paper or cotton
- B. Foam
- C. Fiberglass
- D. Steel



## Performance Assessment

This performance assessment allows 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 and 30 minutes

**Number of Jobs:** 2

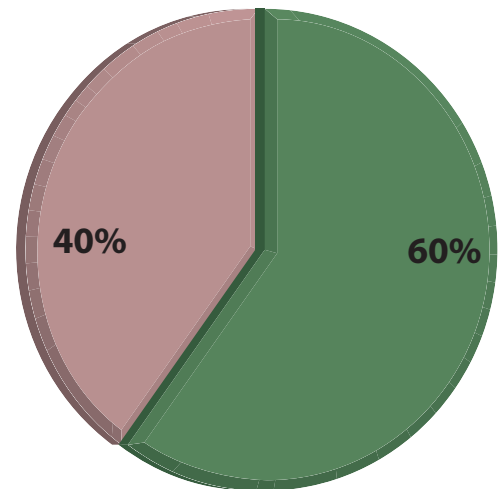
### Areas Covered:

#### 40% Gas Furnace Start-up and Check

Evaluation of assigned order, leak test gas connections, test supply gas pressure, test electric connection for voltage and polarity, start equipment, adjust thermostat heat anticipator setting, test manifold gas pressure, test temperature rise through unit, check fan motor amperage draw, perform steady state efficiency test, complete system operation sheet, time to complete job.

#### 60% Air Conditioning

Evaluation of assigned order, remove unit panels and service caps, wire low voltage control circuit, verify no voltage on all wires, test capacitors, perform compressor checks, check line voltage upstream of disconnect fuses, close disconnect, check line voltage downstream of disconnect fuses, verify and record line voltage at the condensing unit, perform transformer terminals check, measure fan motor common leg amperage, calculate CFM, connect refrigeration gauges and purge air, record/correct/convert pressures, check suction line temperature at evaporator outlet, check/diagnose liquid line drier, evacuate line set and indoor coil, charge refrigerant into system, perform system check, check voltage at air handling unit/heat strips, check heat strips current draw, check dry bulb temperature rise, verify heating/cooling to specifications/enthalpy chart, reinstall unit panels and service caps, time to complete job.



## Sample Job

### Gas furnace Start-Up and Check

**Maximum Time:** 1 hour and 30 minutes

**Participant Activity:** Following the instructions provided, the participant will perform start-up tests on a high efficiency (90 +) gas furnace. The participant will make the necessary adjustments to meet manufacturer's specification for proper operation and perform a steady state efficiency test.

