

# HVAC SUPPORT TECHNICIAN

# CERTIFICATE EXAM

## Certificate Information

**Scope:** Tests a candidate’s general knowledge and HVAC specific knowledge in the areas of safety, tools, heat transfer, comfort, basic science, basic electrical, installation, planned maintenance, system components, and design considerations.

## Qualifications

- This exam and certificate is for early career technicians in the HVAC industry. The exam was designed for technicians that have 6 months to 1 year of experience in the HVAC industry. This test is not designed for HVAC system designers, sales force, or engineers.
- Achieving a passing score on the HVAC Support Technician exam is required to earn the HVAC Support Technician certificate.

## Test Specifications

**Closed Book 2.5 Hours Time Limit 100 Questions Passing Score: PASS/FAIL**

Listed are the percentages of questions that will be in each section of the **HVAC Support Technician** exam:

Section Area Description	Section Percentage	Section Area Description	Section Percentage
Safety	10%	Introduction to Basic Electricity	9%
Tools	8%	Installation	24%
Basic Construction Terms	4%	Service	7%
Using Basic Science	5%	System Components	13%
Achieving Desired Conditions	7%	Applied Knowledge: Design Considerations	6%
Taking Temperature and Humidity Measurements	7%		

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## **HVAC Support Technician**

### **Safety**

#### Personal Safety and Work Practices

- Safety with hand tools
- Using ladders and scaffolds
- Refrigerant in confined spaces
- Safe driving practices
- Clothing, safety equipment, and hard hats
- Safety glasses
- Hearing protection
- Safe practices
  - using warning symbols
- Safe handling of hazardous materials
- Safety within confined spaces
- Safe practices in troubleshooting and repair.

#### Personal Safety Around Moving Machinery

- Blowers
- Pulleys
- Clothing requirements

#### Electrical Safety

- Overview of electrical safety
- Grounding-GFI requirements
- Personal protection

#### Safe Brazing and Soldering Practices

- Overview of safety
- Oxygen and acetylene safety
- Using purging gases-Nitrogen, Carbon Dioxide, etc
- Fire extinguishers
- Documentation for hazardous materials - SDS

#### Safe Handling of Containers

- Disposal
- Securing containers for transport
- Proper storage
- Proper container filling

#### Understanding Hazmat

- Signage for hazardous materials
- Securing hazardous materials for transport
- Documentation for hazardous materials - SDS
- Worker requirements for HAZMAT training

### **Tools**

#### Tools & Scales Basic Math Measurement

- Rulers, compass, square, protractor, etc.
- Measurements - inches, feet, centimeters, millimeters, etc.
- Basic scale drawings

#### Fabrication Tools

- Screwdrivers and nut drivers
- Wrenches, pliers, and allen wrenches

Socket sets  
Levels and squares  
Tool maintenance and care  
Saws and files  
Drills, countersink, reamers, and bits  
Punches, taps, and dies  
Hammers  
Metal tools - metal snips, sheers, benders, breaks, hand formers, calipers, rulers, stapler, etc.

#### Tubing Tools

Benders - spring, lever, etc.  
Flaring tools  
Tube cutters  
Swaging tools  
Reamers

### ***Basic Construction Terms***

#### Room Specs

Construction  
Materials

#### Ceilings

Construction  
Materials

#### Walls

Construction  
Materials

#### Floors

Construction  
Materials

#### Girders & Trusses

Construction  
Materials

### ***Using Basic Science***

#### Chemistry Basics

Properties of matter  
How chemicals react with each other  
Role of chemistry at the jobsite  
Oxidation and combustion  
Weight and density of materials

#### Mathematics

Arithmetic  
Algebra  
Geometry  
Graphs, Charts, and Tables

#### Mechanics

Simple machines  
Conservation of energy  
Complex machines  
Basics of fluid mechanics

## ***Achieving Desired Conditions***

### Temperature

Role of temperature in comfort

### Humidity

Role of humidity in comfort

Adjusting system performance for humidity control

### Air Quality

Ventilation

Air cleaning

Odor control

### Sound

Equipment source

Airflow source

## ***Taking Temperature and Humidity Measurements***

### Physical Measurements - Temperature & Heat

Latent heat

Sensible heat

Temperature

Fundamentals of humidity

Conduction

Convection

Radiation

BTU - Definition and use

### Thermometers

Mechanical thermometers

Electronic thermometers

Gauge / meter calibration

Recording thermometers - digital and analog

## ***Introduction to Basic Electricity***

### Digital Electrical Meters

Identify meters and instruments

### Electrical Basic Terms

Voltage

Amps

Resistance

Power

### AC and DC Circuits

Simple DC circuit

Basic control and loads

Introduction to AC circuits

Effects of AC on controls and loads

## ***Installation***

### Fabricating Copper Tubing

Refrigerant line installation

Bending copper tubing

Copper tubing preparation

Brazing

Flare fittings  
Brazing & soldering equipment

#### Duct Installation

Installing metal duct  
Installing flexible duct  
Installing ductboard  
Installing grilles, registers, diffusers, & damper  
Reconnecting duct when replacing equipment  
Installation of plenums and duct

#### Installing Accessories

Installing thermostats  
Installing electronic air cleaners  
Installing humidifiers

#### Field Wiring

Wiring units & control wiring

#### Refrigerant Circuit Tools

Manifold gauge set  
Evacuation tools  
Charging tools

#### Recovery/Recycling Machines

Recovery machines and recycling machines

#### Installing gas furnaces

Mounting furnaces  
Installation of metal venting systems  
Installation of pvc / abs venting systems  
Installation of condensate drains for cond. furn.  
Installation and/or connection of utilities

### **Service**

#### Introduction to Systems

Heat transfer and the basic cooling cycle principles  
Split systems  
Packaged systems  
Multi-capacity systems  
The basic heat pump refrigerant circuit

#### Planned Maintenance

Mechanical planned maintenance  
Electrical planned maintenance  
Combustion planned maintenance

### **System Components**

#### Duct Systems

Duct systems

#### Components

Outdoor coils  
Compressors  
Refrigerants  
Indoor coils  
Blowers and fans

Air side components

Grilles, registers, & diffusers

Electromechanical Sensing Controls

Electromechanical wall thermostats

Electromechanical temperature controls

Electronic Controls

Electronic thermostats

Air Distribution

Duct systems

Supply blowers

Induced Draft Non-condensing Furnaces - Components

Heat exchangers

Burners

Induced draft blowers

Induced Draft Condensing Furnaces - Components

Heat exchangers

Burners

Induced draft blowers

***Applied Knowledge: Design Considerations***

Design Considerations - Comfort

Temperature

Humidity

Indoor air quality

Sound level

Design Considerations - External Components

Diffusers, registers, and grilles

Accessories

Blueprint reading