Understanding Electrical Circuits for HVAC Syllabus

Description: This 3-day class is designed for beginner to intermediate technicians to understand HVAC electrical circuits, diagrams, and troubleshooting methods. There will be a mix of classroom and hands-on training so that students can practice what they are learning.

Level of Student: Beginner to Intermediate

Tuition: Includes registration, course materials, lunch, and snacks. To qualify for the Early Bird special tuition of $895, you must register on or before the date listed on the calendar. Normal tuition is $1045.

Objectives:

- Understand electrical circuits in the HVAC industry
- Improve competency in proper electrical diagnostics
- Understand electron theory, AC/DC circuits and power generation
- Applying Ohms Law in HVAC circuits
- Understanding motors and compressors
- Understand how to troubleshoot ladder and pictorial diagrams
- Use ladder diagrams to understand sequence of operation
- Understand electrical & meter safety
- Understand hands on wiring and troubleshooting
- Use hopscotch method to troubleshoot electrical circuits

Class Components

Segment 1: Electron Theory

- How volts, amperage and Ohms react in a circuit as described by Electron Theory
- HVAC Terms
- Electrical loads in HVAC circuits
    - Resistive loads
        - Ohms law (volts/ amps/ ohms)
        - Power law (watts/ volts/ amps)
    - Inductive loads
        - Various motor types
            - Single phase

        - 3 phase
        - Hard Start Kits
        - Soft Start Kits
        - Relays
    - Capacitors
    - Transformers
        - Types
        - Sizing

Hands-on practice includes:

- Motors

Segment 2: HVAC Electrical Components

- The difference between thermostats and sensors
    - Wiring diagrams
    - Effects of thermostat and sensor locations
    - Diagnostics
    - Programming, features and benefits
    - Dual fuel options
- HVAC Electrical Components & Functions
    - Common electrical failures, cause and effect, and their remedies
    - Identifying weak components and needed proactive repairs
    - Resistive loads: strip heaters, crank case heaters, heat anticipator, sequencers, etc.
    - Inductive loads: motors, compressors, relays, etc.
    - Capacitors: run capacitors, start capacitors
    - Circuit boards: furnace boards, air handler boards, defrost controls

Hands-on practice includes:

- Thermostats
- Wiring boards
- Components
- Function check out sheet

Segment 3: Troubleshooting & Safety

- Using furnace and heat pump electrical labels
    - Use of ladder diagrams and sequence of operation to troubleshoot
    - Pictorial diagrams
    - Electrical symbols
- Electrical & Meter Safety
    - Flash and arc protection
    - Proper use of amp meter, volt meter, and Ohm meter
- Sizing wire conductors for HVAC equipment
    - Preventing light flicker and voltage drop
    - Determining when to derate ampacity due to physical circumstances
- Sizing over current protection to protect wires per National Electrical Code
    - Breaker sizes
    - Fuse sizes and types

Hands-on practice includes:

- Troubleshooting

To register for this class, visit HBTI's website www.hvacinstitute.com or call the office at (253) 638-7797.