

Lesson 1 - Heating with Electricity

Objectives:

- Explain the difference between conventional combustion heating and electric heating.
- Define the following terms: power, resistance, current, voltage.
- State Ohm's Law.
- Solve mathematical equations that contain the following units of measurement: volts, amperes, ohms, watts, and BTUs.
- Describe the characteristics of a good resistor.
- Explain the difference between direct thermostat control and relay control.
- Explain the difference between direct current and alternating current.
- Explain the difference between single-phase power and three-phase power.
- Explain the difference between line voltage and low voltage.

Lesson 2 - Resistance Heating

Objectives:

- Identify difference types of electric heating elements.
- List and describe the different types of electric heaters.
- Explain the different approaches to central electric heating systems.
- Identify the different types of electric heaters used for space heating in commercial and industrial applications.
- Demonstrate how to size a makeup air unit.
- Explain how insulated cable and wire are used for melting snow and ice.

Lesson 3 - Heat Pumps

Objectives:

- Describe the basic operation of a heat pump.
- Name the different types of heat pumps, as classified by the source of heat and the medium to which heat is dispersed.
- Explain the difference between packages units and split-system units.
- Demonstrate how to calculate the coefficient of performance for a heat pump.
- Explain how heat pumps are rated for efficiency.
- Describe how, when and why auxiliary heat is used with heat pumps.

Lesson 4 - Radiant Heating Systems

Objectives:

- Explain how various types of electric radiant heaters operate.
- Describe infrared snow-melting systems.
- Select high-intensity electric infrared heaters to fit given applications.
- Size electric infrared heaters to heat buildings.
- Design spot heating systems using electric infrared heaters.

Lesson 5 - Duct Heaters and Furnaces

Objectives:

- Explain the proper installation of electric duct heaters and furnaces.
- Define the key technical terms used in electric heating.
- Install duct work for electric duct heater and furnace systems.
- Explain electrical wiring applications
- Describe the safety controls required for electric duct heaters and furnaces.

Lesson 6 - Baseboard and Unit Heaters

Objectives:

- Install electric baseboard, floor, ceiling, and unit heaters properly.
- Demonstrate proper wiring techniques.
- Perform start-up and pre-operational inspections and routine maintenance for electric unit heaters.

Lesson 7 - Radiant Heat Installation

Objectives:

- Install electric infrared heaters.
- Install natural convection heaters.
- Install radiant ceiling panels.
- Lay out an in-floor radiant heating system.
- Describe how floor coverings affect performance.
- Determine cable spacing.
- Wire an in-floor heating system, and correctly install the thermostat.

Lesson 8 - System Control Devices

Objectives:

- Adjust the heat anticipator on a thermostat.
- Calibrate different kinds of thermostats.
- Check out and troubleshoot control systems.

Lesson 9 - Electric Furnaces

Objectives:

- Explain the general characteristics of electric furnaces.
- Describe sequencer operation.
- Start up, operate, and adjust electric furnaces.
- Check electric heater operation.

Lesson 10 - Duct Heaters

Objectives:

- Install duct heaters.
- Explain contactor power circuitry.
- Install and maintain air flow switches for duct heaters.

Lesson 11 - Multi-Step Controllers (Part 1)

Objectives:

- Explain the function and operation of cam-operated electric heat multi-step controllers.
- Explain the function and operation of pneumatic electric heat multi-step controllers.
- Explain the function and operation of solid-state electric heat multi-step controllers.

Lesson 12 - Multi-Step Controllers (Part 2)

Objectives:

- Describe the operation of multi-stage electronic heat thermostats and controls.
- Describe the operation of electronic electric heat multi-step controls.

Lesson 13 - Electronic Sequencing Control

Objectives:

- Describe the function and operation of multistage electronic heating sequencing control systems.
- Explain the difference between single-zone and multizone control systems.

Lesson 14 - Decentralized Electric Heating Systems

Objectives:

- Describe different types of decentralized heating systems.
- Explain common methods used to control baseboard heaters.
- Define cross control.
- Discuss the advantages and disadvantages of ceiling cables.
- Devise a spacing arrangement of infrared heaters to radiate a required space.
- Explain common methods used to control infrared heaters.

Lesson 15 - Electric Boilers

Objectives:

- Explain the functions of electric boilers used for space heating.
- Explain the functions of electric boilers used for steam humidification.