

Lesson 1 - Basic Steam and One-Pipe Heating Systems

Objectives:

- Define the properties of saturated steam and of valves.
- Explain why air venting is necessary to allow steam to enter a system.
- List the basic equipment of a one-pipe heating system.
- Explain the basic steam loop and proper steam piping pitch.
- Describe the Hartford loop.
- Describe the "A" dimension.
- List the types of one-pipe systems.

Lesson 2 - Two-Pipe Steam Heating Systems

Objectives:

- Describe the principles of operation for air venting and trapping.
- List the types of two-pipe systems.
- Identify system problems that can cause poor heating.
- Describe the causes and cures of boiler flooding.
- Define water hammer.
- List the causes of premature air vent failure.
- Explain what causes steam loss.
- Describe condensate pump and boiler feed pump problems.

Lesson 3 - Steam Traps

Objectives:

- Explain the basic functions of steam traps.
- Describe the operating principles of the various types of traps.
- List the four steps for sizing a trap.
- Explain the installation of a trap.

Lesson 4 - Steam Specialties

Objectives:

- Describe the function and operating principle of vents in a steam system.
- Explain the installation of steam vents for proper operation and to prevent splitting.
- Describe the types of pumps.
- Name the two types of steam pressure reducing valves.
- Describe the installation of regulators.

Lesson 5 - Steam Piping Practices

Objectives:

- Describe the two types of water hammer that occur in steam heating systems.
- Explain the differences between the wet return line and dry return line.
- Recognize codes that may be used to identify components in a steam system design diagram.
- Explain why the Hartford loop is still used in current steam heating systems.
- Describe the connections for unit heaters in one-pipe and two-pipe systems.
- Describe the advantages and uses of steam pressure reducing valves in high-pressure, steam heating distribution systems.

Lesson 6 - Converters and Instantaneous Heaters

Objectives:

- Describe the proper installation of the heat exchange to permit condensate drainage.
- Properly size and install a steam trap and regulating valve.
- Review the need for gravity drainage of condensate and when to install a condensate pump.
- Describe the installation of a condensate cooler.
- Define flash steam and how to calculate the energy waste from high temperature condensate.
- Determine steam and condensate loads.

Lesson 7 - Steam Heat System Controls

Objectives:

- Describe the difference between a one-pipe and two-pipe steam system.
- Size the piping in a steam system.
- Determine the proper location of main vents to prevent spiting and damage to the vents.
- Explain the important factors of the capacity of a steam pipe.
- Describe the control and distribution of steam in a system.
- List the types of one-pipe steam systems.
- Describe a gravity return system.
- Explain the role of a mechanical condensate return system.

Lesson 8 - Unit Heaters and Convectors

Objectives:

- Name the types of convectors used for steam heating.
- Explain piping guidelines for convectors and unit heaters.
- Describe installation detail, allowing for pipe expansion and pitch in steam systems.
- List the locations of unit heaters.
- Describe the type of steam trap for a unit heater.

Lesson 9 - Boilers

Objectives:

- Define steam boilers.
- Describe the types of boiler construction.
- Explain the concept of flue gas travel in a boiler.
- Describe the various types of heat distributing units.
- Name the basic boiler controls and describe their functions.

Lesson 10 - Boiler Start-Up and Operation

Objectives:

- Describe the objective of the Manufacturer's Data Report and code approvals.
- Explain the process of cleaning and filling a new boiler.
- List the guidelines for starting up a boiler.
- Describe how to add a boiler on the line with other boilers.
- Test the feeder using the "broken union test."
- Explain the processes for maintaining a boiler and preparing it for return to service or storage.
- Describe the procedure for feed water treatment.
- List and describe the times for boiler repairs and maintenance.

Lesson 11 - Boiler Installation

Objectives:

- Install a boiler in a suitable location.
- Explain the characteristics of a good boiler room.
- Name various component functions in regard to boilers.
- Describe the various components of a burner and their functions.

Lesson 12 - Troubleshooting Temperature and Pressure Regulators

Objectives:

- Understand how to select a temperature range and size of an industrial type nonelectric temperature regulator.
- Explain the maintenance procedure for an industrial type nonelectric temperature regulator.
- Describe the installation of an industrial type regulator.
- Learn how to dismantle a pilot-operated temperature regulator.
- Explain the process for testing and calibrating temperature pilots.
- Describe some installation and piping practices for pressure reducing valves.