

# Condensers and Cooling Towers

## Course 435: Condensers and Cooling Towers

Covers the function, construction, and operation of both air- and water-cooled condensers and related devices. Discusses cooling towers and spray ponds, including maintenance and troubleshooting. Includes a lesson on evaporative condensers. Concludes with a discussion of water-related problems and how to solve them.

TPC Training is accredited by IACET to offer **0.5 CEU** for this program.



### Lesson 1: Air-Cooled Condensers

#### Topics

The Function of a Condenser; Condenser Capacity; Air-Cooled Condenser Construction; Types of Air-Cooled Condensers; Effects of Ambient Temperature; Pumpdown Circuit; Low-Ambient Controls; Receivers; Pressure-Relief Devices; Air-Cooled Condenser Maintenance; Troubleshooting Air-Cooled Condensers

#### Objectives

- Contrast the two types of air-cooled condensers—natural draft and forced air.
- Describe the construction of an air-cooled condenser, including the tubes, fins, headers, and subcooling circuit.
- Name the factors that affect condenser capacity.
- Explain the effects of ambient temperature on the capacity of an air-cooled condenser.
- Describe various types of low-ambient controls for air-cooled condensers.
- Explain how spring-loaded pressure-relief valves and fusible plugs protect against possible explosions caused by high pressure.
- List the periodic maintenance procedures common to most air-cooled condensers.

### Lesson 2: Water-Cooled Condensers

#### Topics

Water-Cooled Condenser Systems; Types of Water-Cooled Condensers; Pressure-Relief Devices; Water-Regulating Valves; Strainers; Water-Cooled Condenser Maintenance; Cleaning and Inspection; Troubleshooting Water-Cooled Condensers

#### Objectives

- Name and describe the basic types of water systems used by water-cooled condensers.
- Define the terms makeup water and fouling factor.
- Describe the construction of the various kinds of water-cooled condensers.
- Explain the purpose of the accessories used with water-cooled condensers—pressure-relief devices, water-regulating valves, and strainers.
- Explain water-cooled condenser maintenance procedures, including inspection for leaks and chemical and mechanical cleaning.

### Lesson 3: Cooling Towers and Spray Ponds

#### Topics

The Function of Cooling Towers and Spray Ponds; Cooling Tower and Spray Pond Capacity; Types of Cooling Towers; Spray Ponds; Cooling Tower and Spray Pond Systems; Cooling Tower Controls; Cooling Tower Systems for Winter Operation; Cooling Tower and Spray Pond Maintenance; Troubleshooting Cooling Towers and Spray Ponds

#### Objectives

- Explain the function of cooling towers and spray ponds and the factors that affect their capacities.
- Identify the basic types and construction of cooling towers and spray ponds.
- Describe the components required in a cooling-tower or spray-pond water-circulating system and explain the purpose of each.
- Describe the various devices used to control cooling-tower capacity.
- Explain cooling-tower and spray-pond maintenance procedures.

### Lesson 4: Evaporative Condensers

#### Topics

Types of Evaporative Condensers; Refrigerant-Circulation System; Air-Circulation System; Water-Circulation System; Evaporative-Condenser Capacity Control; System Operation Under Freezing Conditions; Evaporative-Condenser Maintenance; Troubleshooting Evaporative Condensers

#### Objectives

- Identify the basic types of evaporative condensers.
- Describe the components that make up the three circulation systems in an evaporative condenser—refrigerant, air, and water—and explain the operation of each.
- List the kinds of capacity controls used on evaporative condensers and explain the operation of each.
- Explain how to provide freeze protection for an evaporative condenser.
- Outline evaporative-condenser maintenance procedures.

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### Lesson 5: Controlling Water-Related Problems

#### Topics

Chemical Water Treatment; Types of Water Problems; Causes of Corrosion; Corrosion Control; Causes of Scale; Types of Scale; Scale Control; Biological Fouling; Control of Biological Fouling; Wood Deterioration and Its Control; Chemical Feeding

#### Objectives

- Describe the three categories of water problems encountered in the water systems of water-cooled equipment.
- Name the five causes of corrosion and explain how to control them.
- Describe the three most common types of scale, their causes, and how to control them.
- List the three types of organisms that grow in water systems and explain how to control them.
- Describe the three types of wood deterioration and explain how to control them.
- Explain the operation of three chemical-feeding devices used in water systems.