

The Refrigeration Cycle

Course 431: The Refrigeration Cycle

Introduces the basic concepts needed for an understanding of refrigeration. Traces the basic refrigeration cycle. Explains the concepts of heat, temperature, humidity, dewpoint, enthalpy, and simple psychrometrics. Concludes with a lesson on the tools and instruments needed for refrigeration servicing and safe work practices.

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



Lesson 1: Refrigeration and Air Conditioning Basics

Topics

Definition of Refrigeration; Definition of Air Conditioning; The Composition of Matter; The States of Matter

Objectives

- Define refrigeration and air conditioning and explain how they differ.
- Describe the two methods of lowering the temperature of a material.
- Name the three physical states of matter.
- Identify what causes matter to change its state.

Lesson 2: Heat, Pressure, and Change of State

Topics

Heat; Temperature; Methods of Heat Transfer; Sensible and Latent Heat; Heat Quantity; Pressure; How Pressure Change Affects Boiling Point; The Importance of Pressure in Refrigeration

Objectives

- Explain the difference between sensible and latent heat.
- Compare the Fahrenheit and Celsius temperature scales and convert temperatures from one to another.
- Name and describe the three methods of heat transfer.
- Define latent heat of fusion and latent heat of vaporization.
- Explain the difference between absolute pressure and gauge pressure.
- Describe the effect of pressure changes on boiling point.

Lesson 3: The Basic Refrigeration Cycle

Topics

The Vapor-Compression Refrigeration Cycle; Evaporation; Compression; Condensation; Liquid Metering; The Refrigerant in Action; Types of Evaporators; Types of Compressors; Types of Condensers; Types of Metering Devices

Objectives

- Explain the function of each of the major refrigeration system components: evaporator, compressor, condenser, and metering device.
- Define the terms subcooling and superheating.
- Explain the function of the refrigerant in a refrigeration system and trace its path.
- Contrast dry-expansion and flooded evaporators.
- Name the five main types of compressors.
- Define cooling medium and name the two most commonly used.
- Explain the operation of the six most common metering devices.

Lesson 4: Air Properties and Simple Psychrometrics

Topics

Air Properties; Temperature; Humidity; Specific Volume; Enthalpy; The Psychrometric Chart; Determining Dewpoint Temperature; Determining Specific Humidity; Determining Relative Humidity; Determining the Enthalpy of Air

Objectives

- State the definition of psychrometrics.
- List the four air properties important in psychrometrics.
- Differentiate between dry- and wet-bulb temperature and tell how each is measured.
- Define the term saturated air.
- Define specific humidity and relative humidity.
- Define enthalpy and explain how it is calculated.
- Demonstrate how to use the psychrometric chart to determine dewpoint temperature, specific humidity, relative humidity, and enthalpy.

Lesson 5: Tools, Test Instruments, and Safe Work Practices

Topics

Tools and Instruments; Pressure Gauges; Pulling a Vacuum; Vacuum-Measuring Instruments; Leak Detectors; Thermometers; Hygrometers; Air-Handling Tools and Test Instruments; Electric Test Equipment; Recording Instruments; The Importance of Safety

Objectives

- Describe a gauge manifold and tell how it is used.
- Tell what it means to evacuate a refrigeration system and tell how it is done.
- List and describe at least three methods of leak detection.
- Explain the construction of a sling psychrometer and tell how and why it is used.
- Name the instrument used to measure relative humidity.
- Name the instrument used to measure each of the following electrical values: potential difference, current, resistance, and electric power.
- List the four classes of work area hazards, and give an example of each.