

# Types of Refrigeration Systems

## ◆ 4 Basic Refrigeration Systems

### ◆ Direct Expansion (DX)

- Air-Cooled condenser

### ◆ Direct Expansion (DX)

- Water-Cooled Condenser

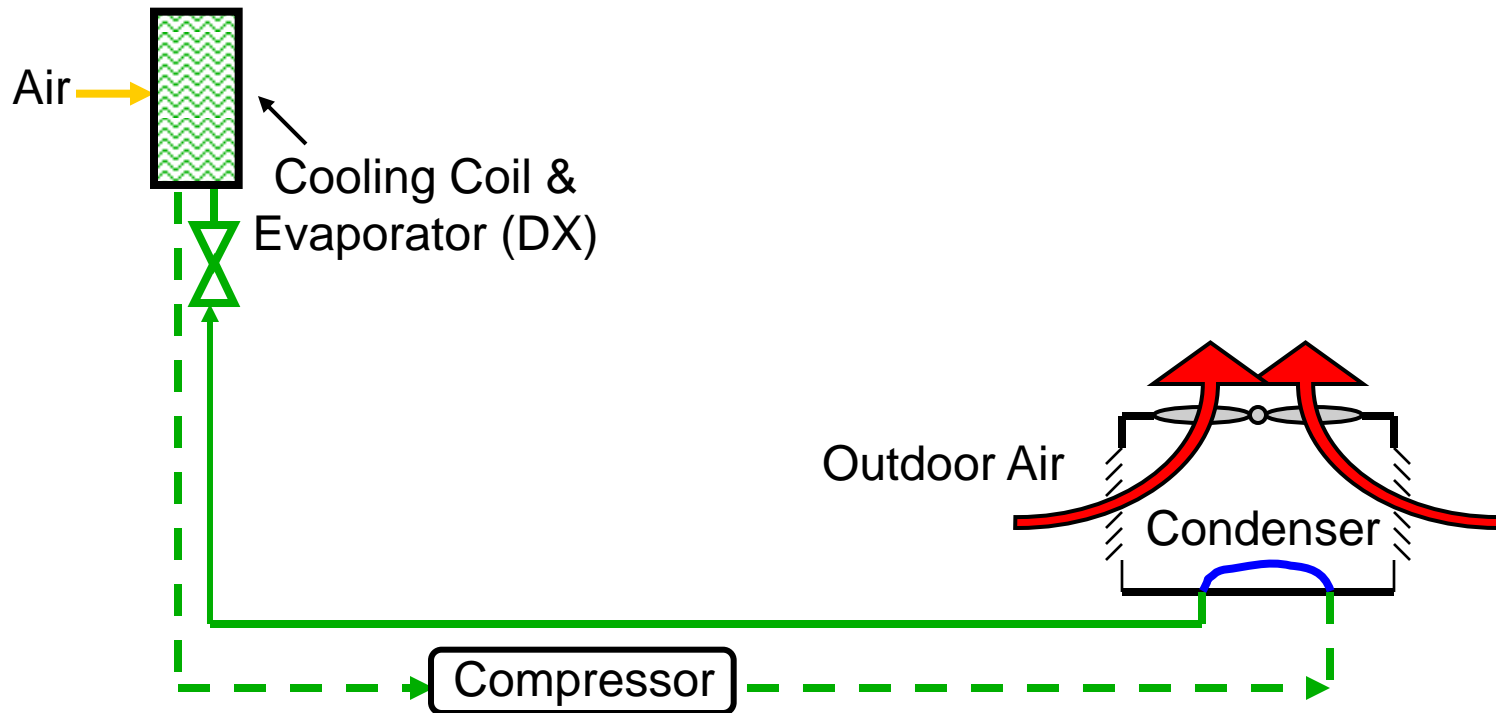
### ◆ Chilled Water System (CW)

- Air-Cooled Condenser

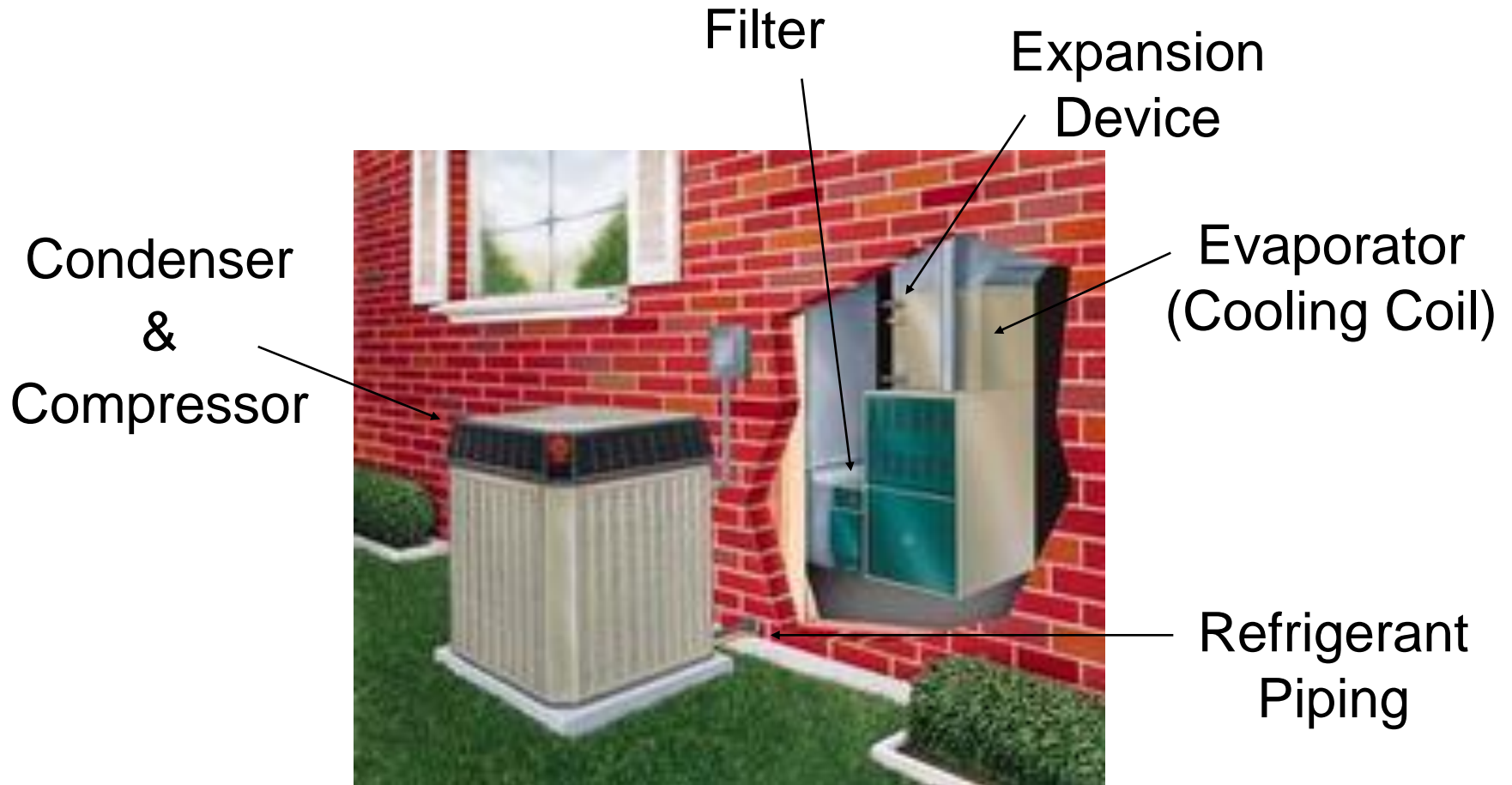
### ◆ Chilled Water System (CW)

- Water-Cooled Condenser

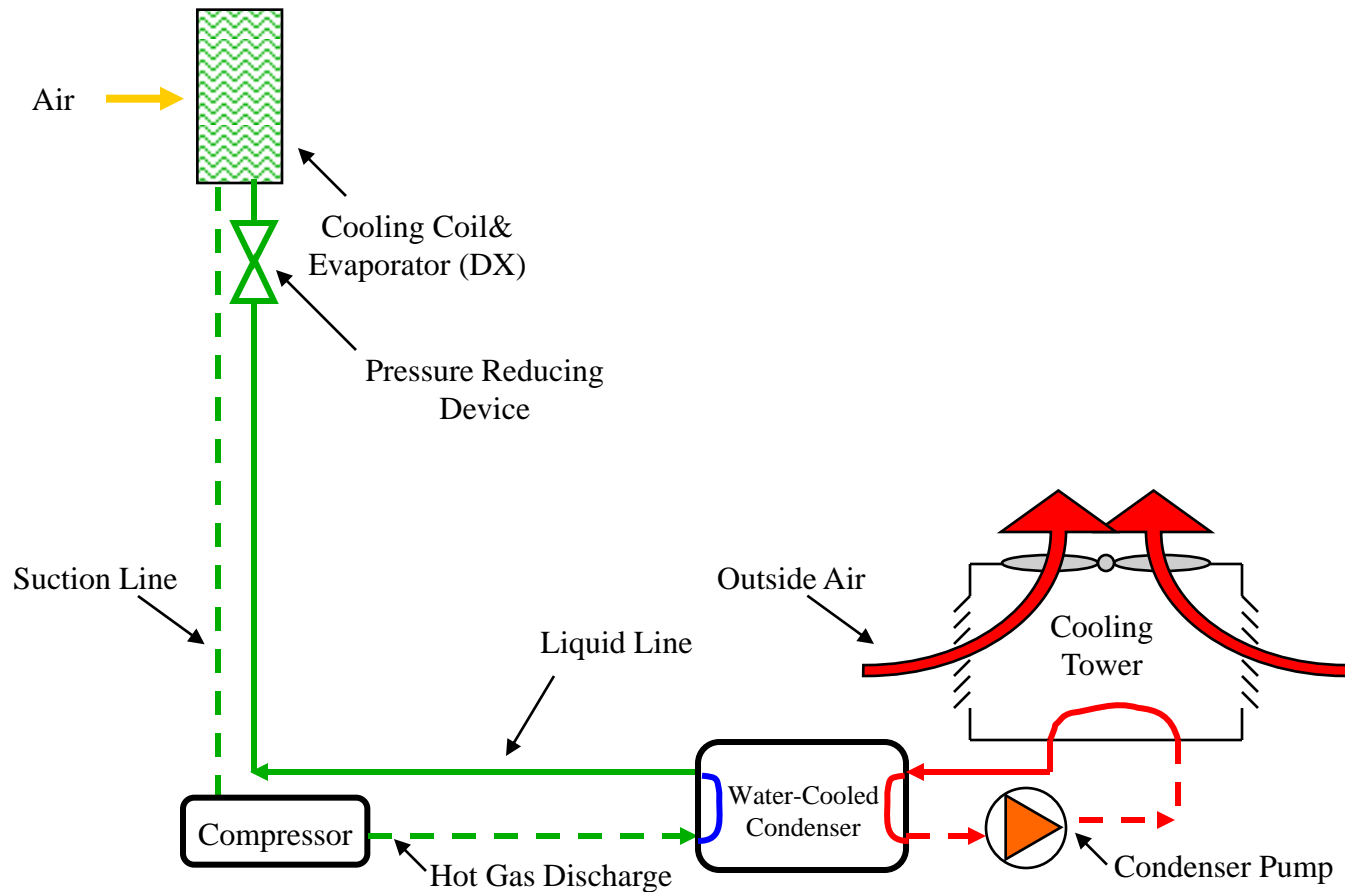
# DX Cooling with Air-Cooled Condensing



# Typical Residential System

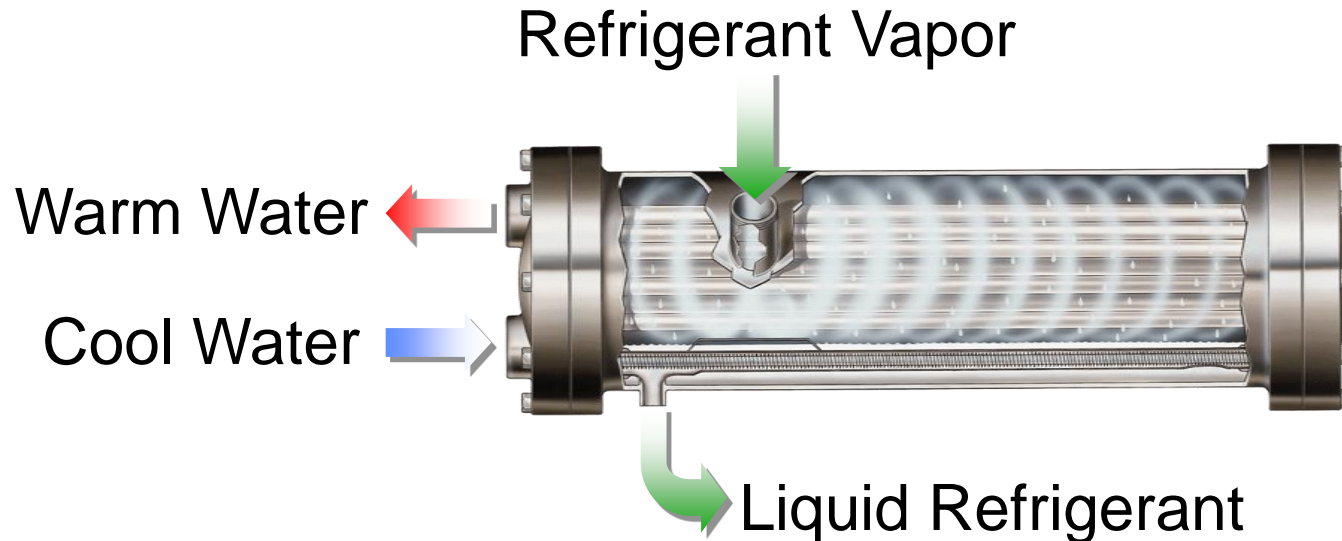


# DX Cooling with Water-Cooled Condensing



# Water-Cooled Condenser

- ♦ Water flows through tubes
- ♦ Refrigerant vapor fills shell surrounding tubes
- ♦ Heat transfers from refrigerant to water
- ♦ Refrigerant condenses



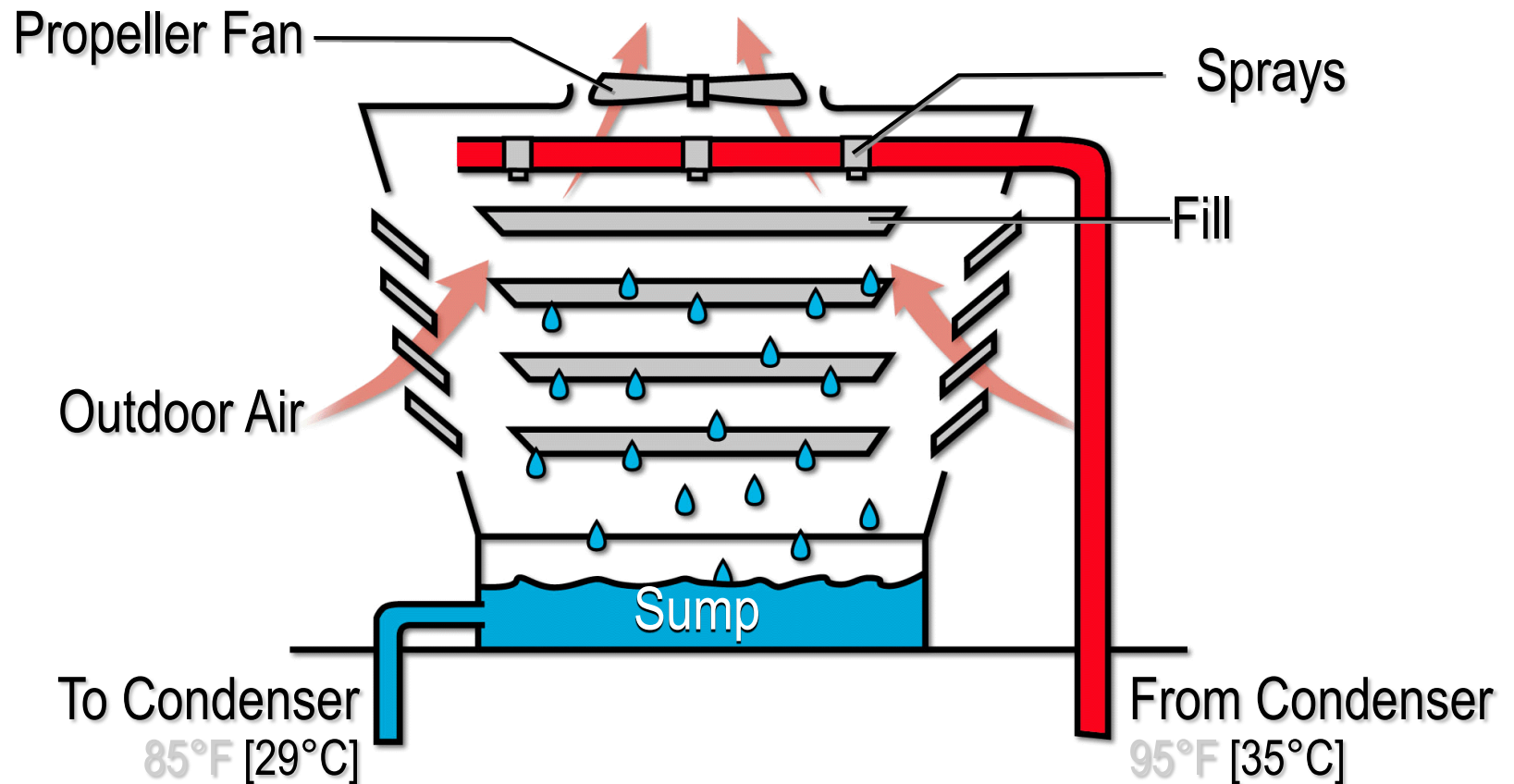
# DX Cooling with Water-Cooled Condensers

♦ Self Contained

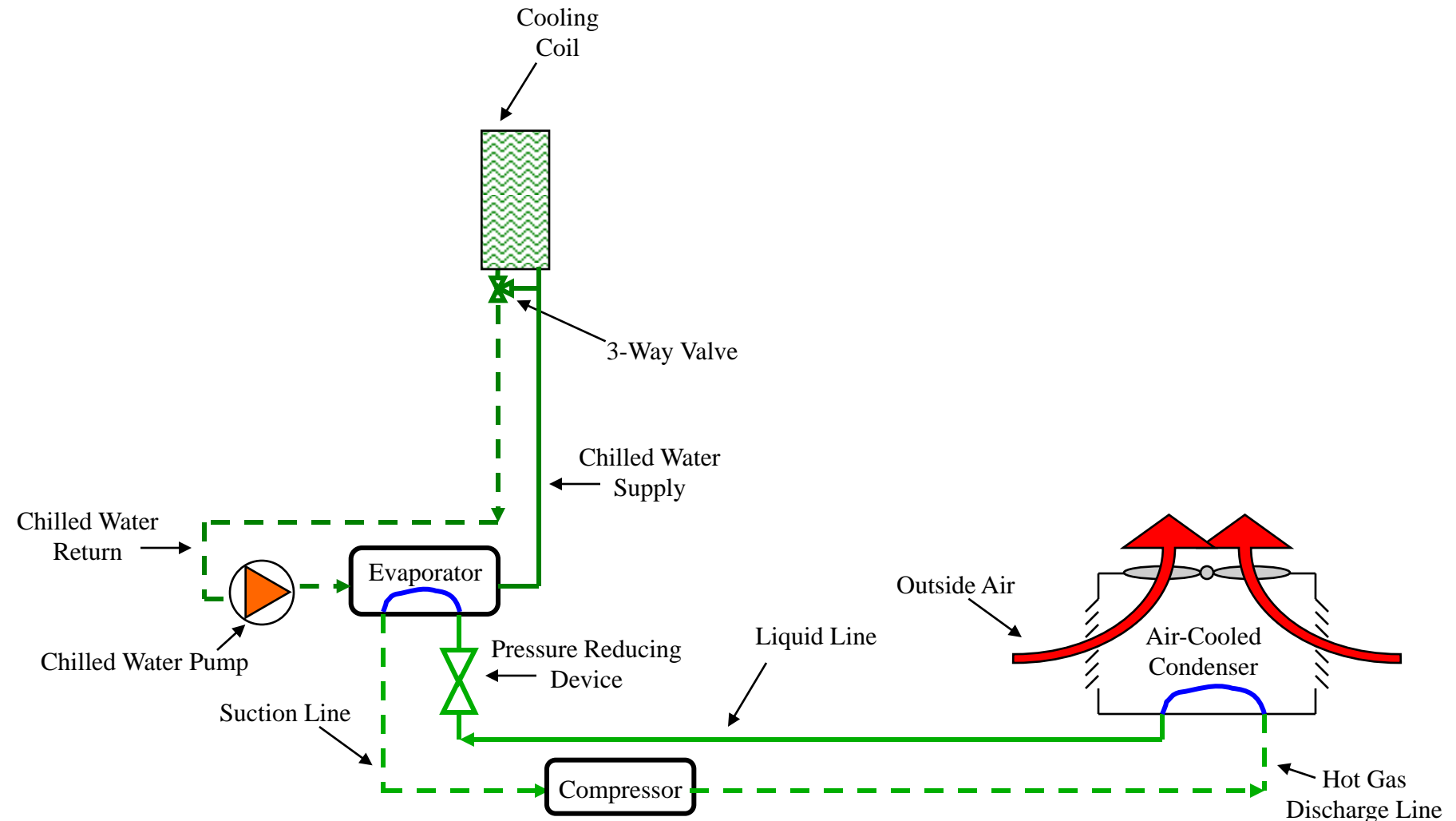
◆ Macon, GA



# Cooling Tower

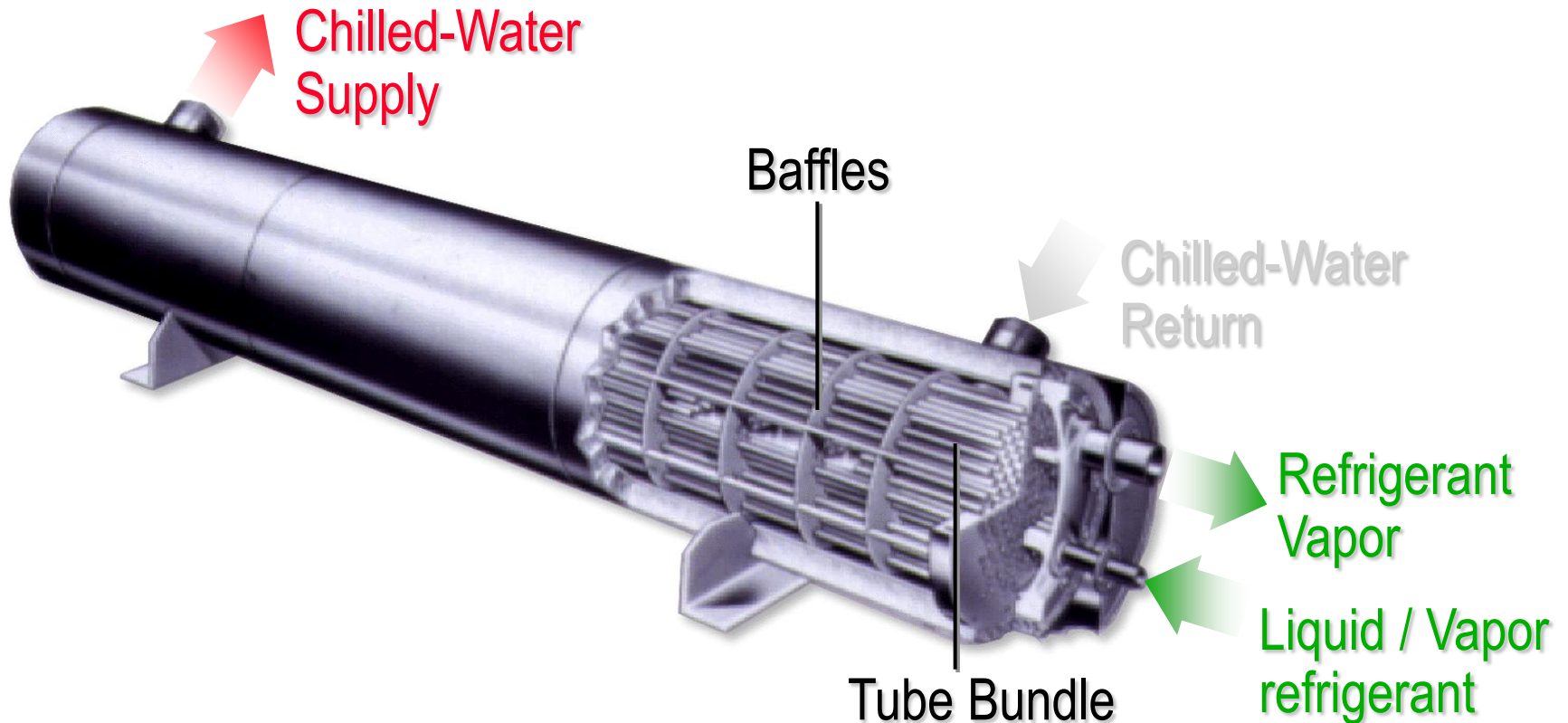


# Chilled Water Cooling with Air-Cooled Condensing





# Shell-and-Tube Evaporator



# Chilled Water Cooling with Air-Cooled Condenser

- ♦ RTAA

  - ◆ Pueblo, CO

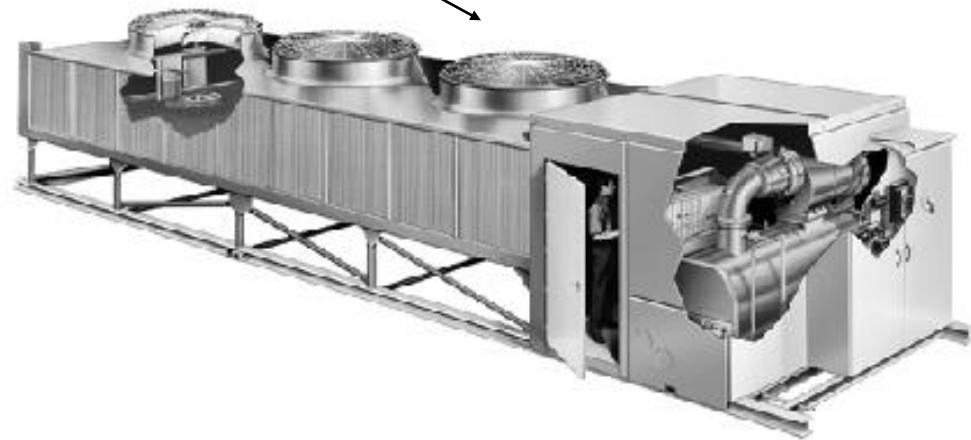
- ♦ Centrifugal Chiller

  - ◆ Charmes, France

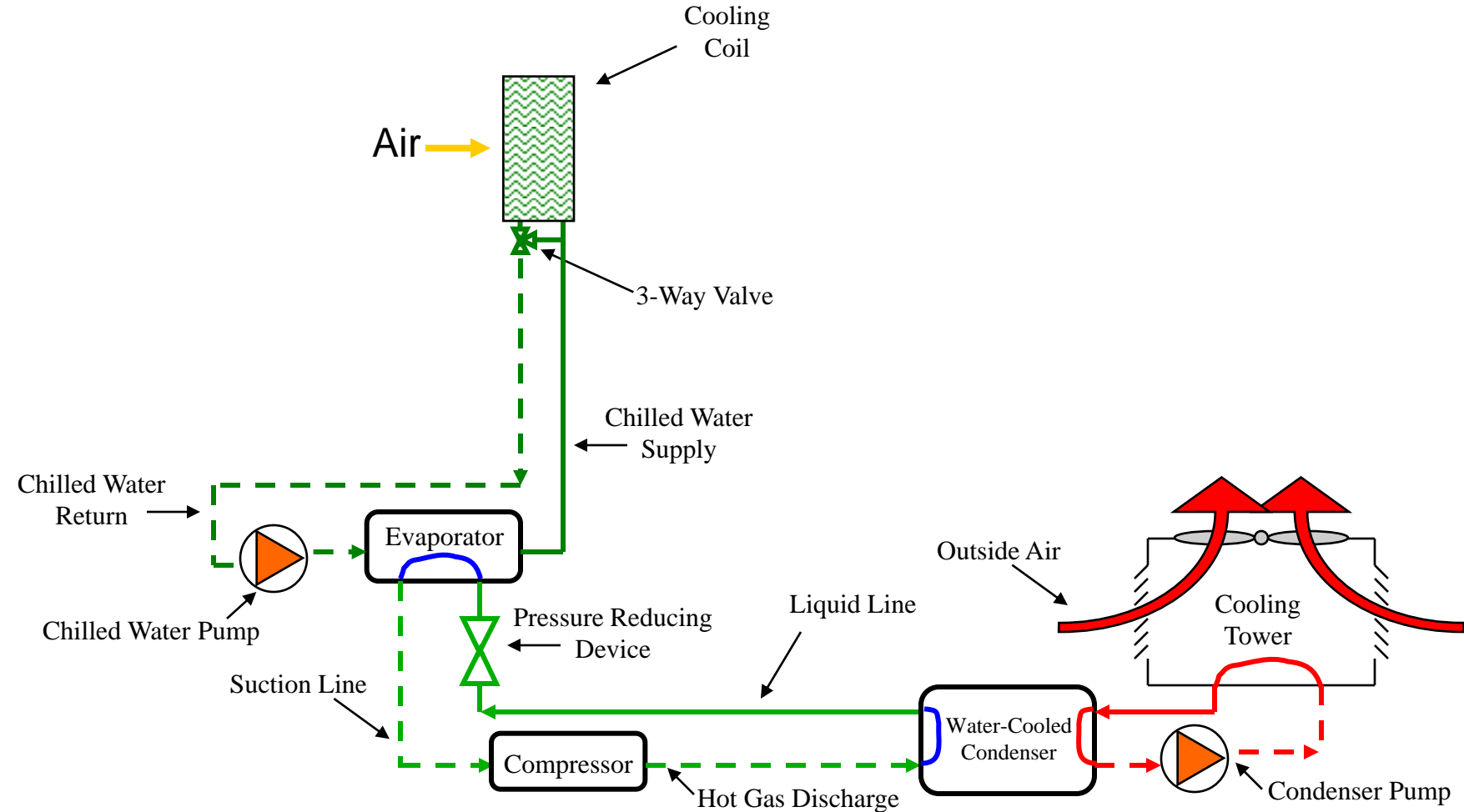
- ♦ Packaged Air-Cooled Chiller

  - ◆ Clarksville, TN

  - ◆ Pueblo, CO



# Chilled Water Cooling with Water-Cooled Condensing



# Chilled Water Cooling with Water-Cooled Condenser

- ◆ Centrifugal Chiller

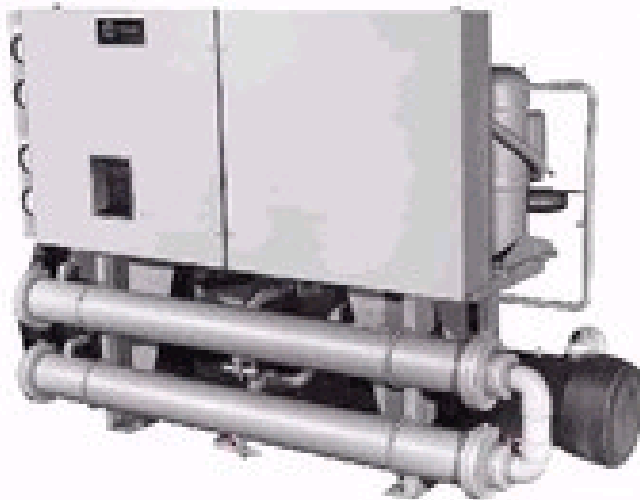
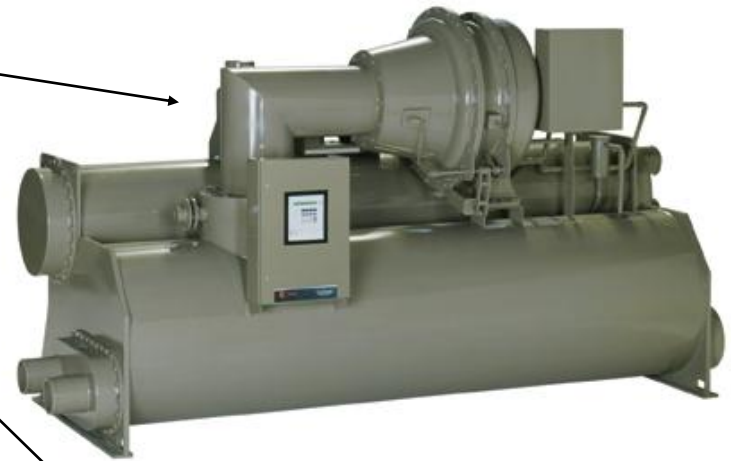
  - ◆ LaCrosse, WI

- ◆ Helical-Rotary (Screw) Chiller

  - ◆ Pueblo, CO

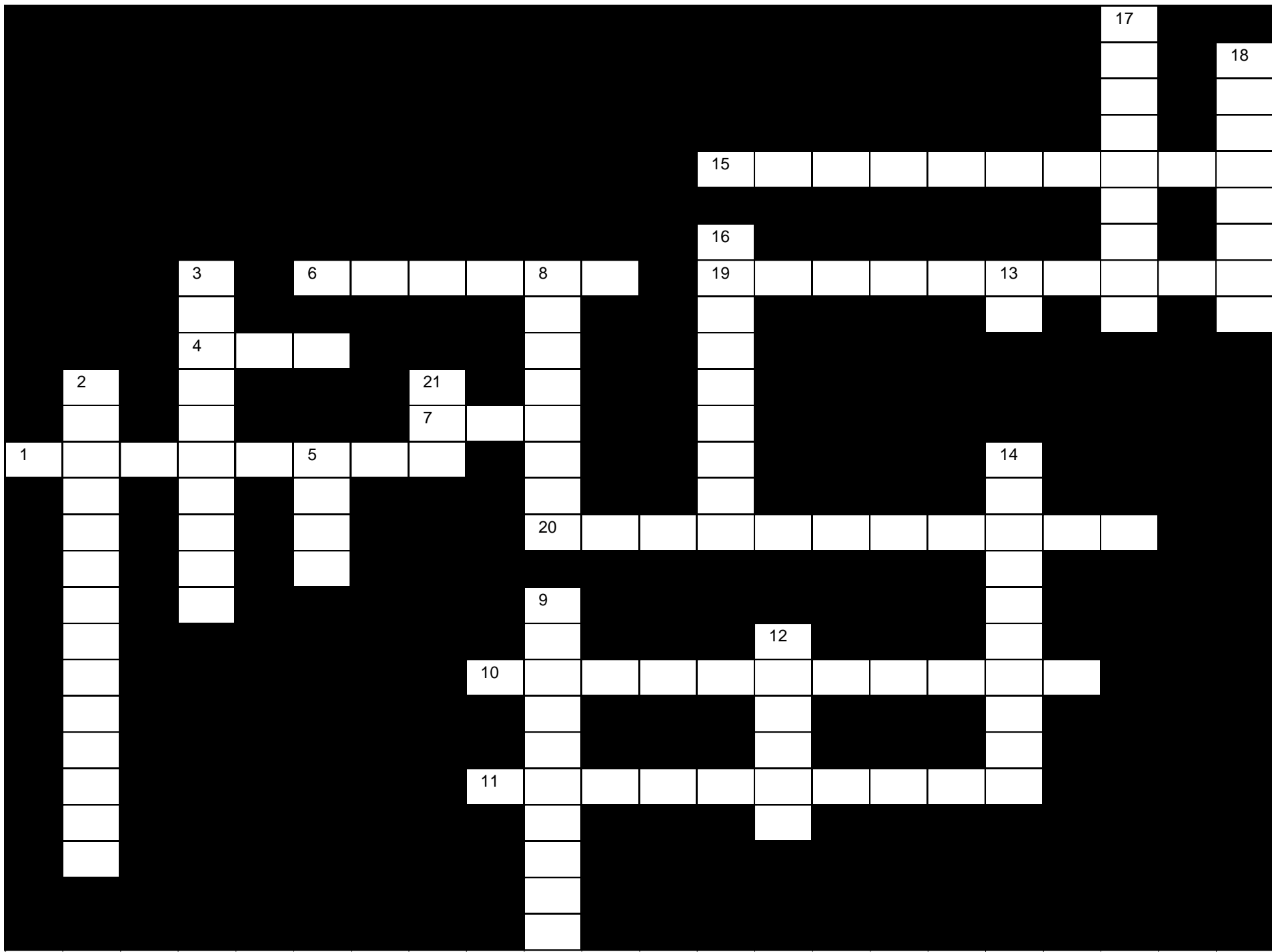
- ◆ Scroll Chiller

  - ◆ Pueblo, CO



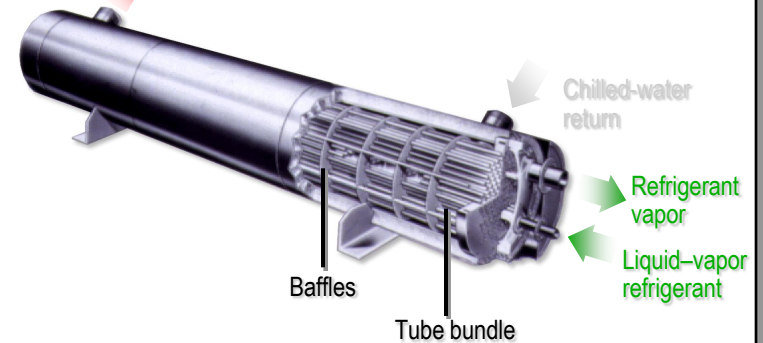
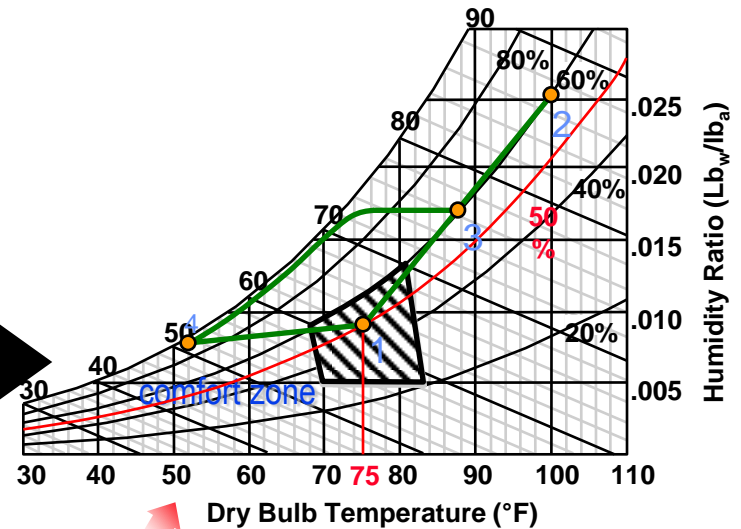
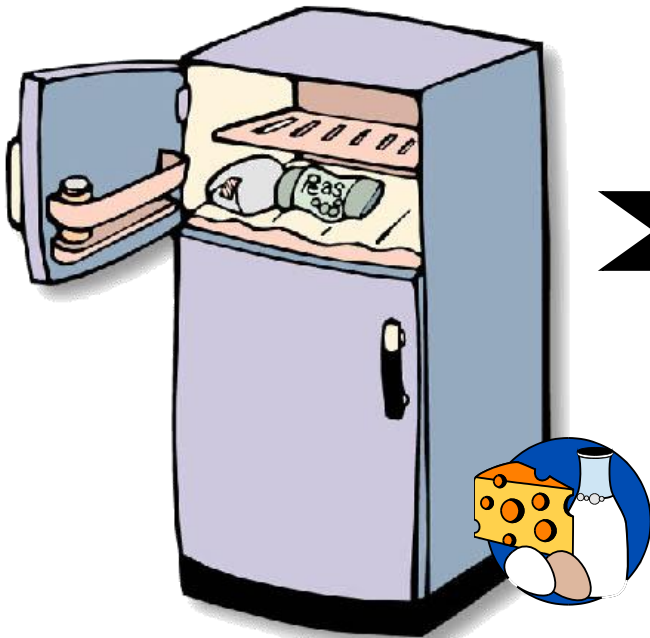
# Water Cooled Condenser and Cooling Towers





# Summary of Intro to HVAC

## What Is Refrigeration?



From the Trane Library

# More on HVAC Fundamentals

- ♦ **Air Conditioning Clinics**
  - ◆ **Psychrometry**
  - ◆ **Refrigeration Cycle**
  - ◆ **Refrigeration Components**
- ♦ **Engineered System Clinics**
  - ◆ **Understanding HVAC Systems**
  - ◆ **Airside Systems**
  - ◆ **Refrigeration Systems**
- ♦ **Trane Systems Manual**



# Definitions: A-C

# Definitions: D-G

# Definitions: H-O

# Definitions: P-U

# Definitions: V-Z