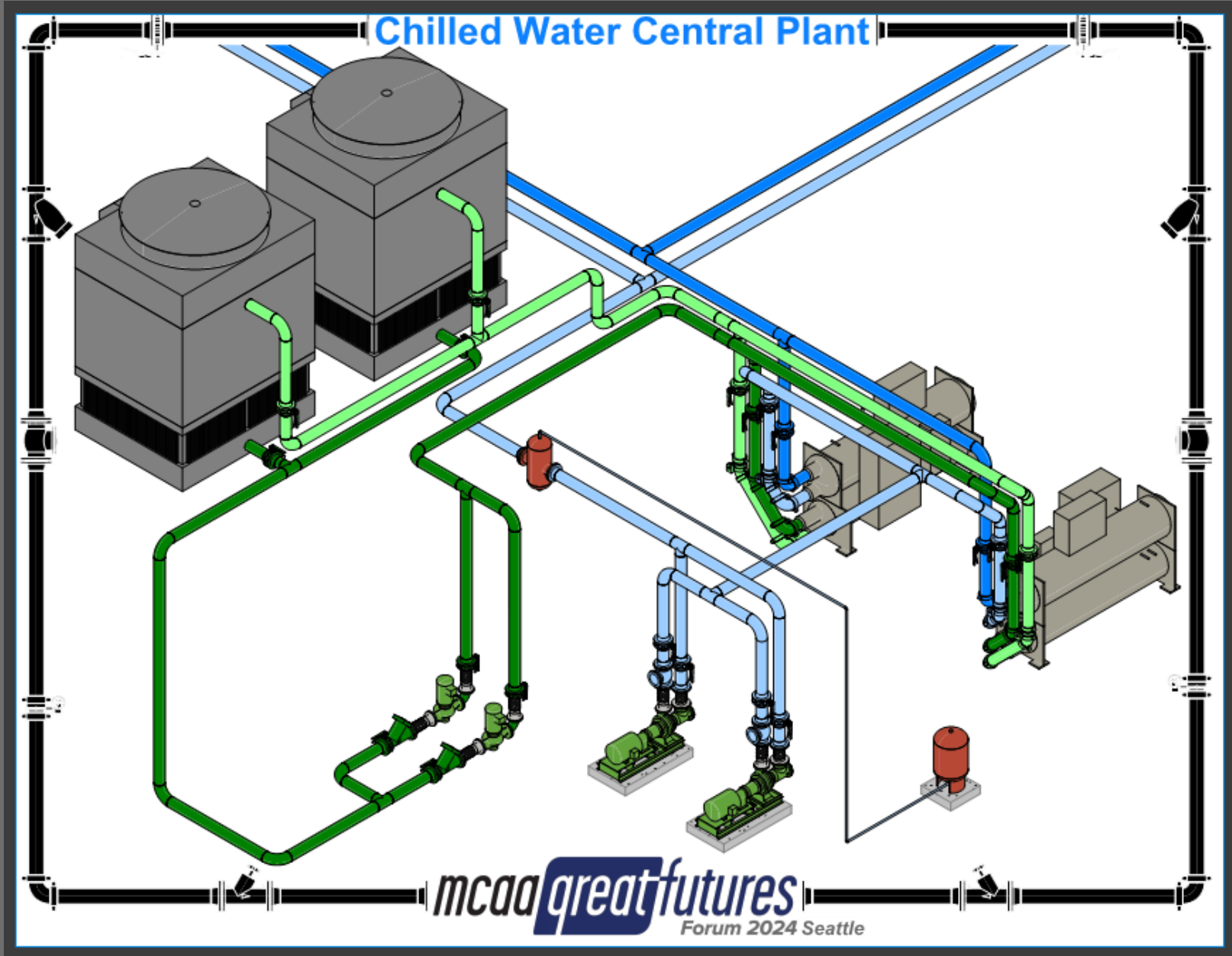


# Mechanical Puzzle

## Chilled Water Central Plant



# Chilled Water Central Plant

**mcaagreatfutures**  
Forum 2024 Seattle

# What is the purpose of a Chilled Water Central Plant?

Simply put - To produce cold water and reject heat to the outside!

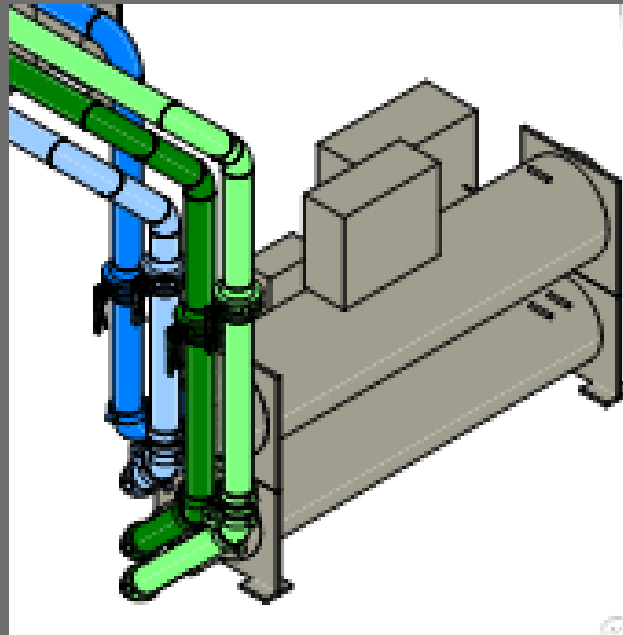
Scientifically – Involves Thermodynamics, Refrigeration Cycle, and Heat Transfer

# Main Components of the Chilled Water Central Plant?

- Chiller
- Cooling Tower
- Pumps
- Air Separator
- Expansion Tank
- Piping

# What is the Life Blood of the Chilled Water Central Plant?

## THE CHILLER

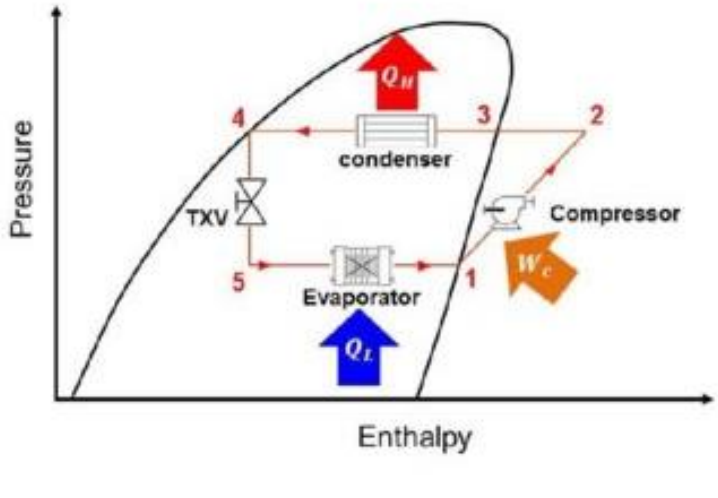
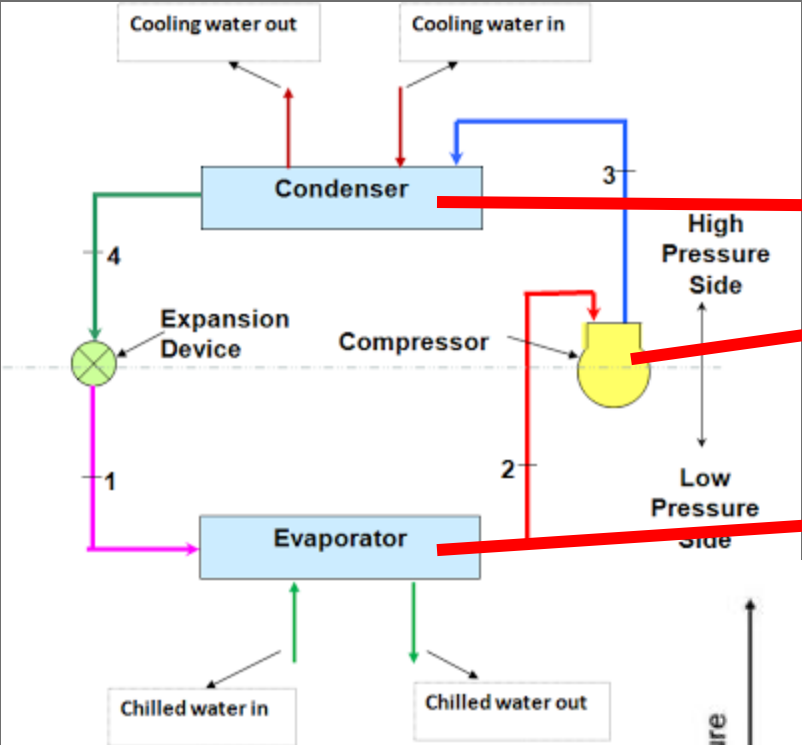


# Chillers

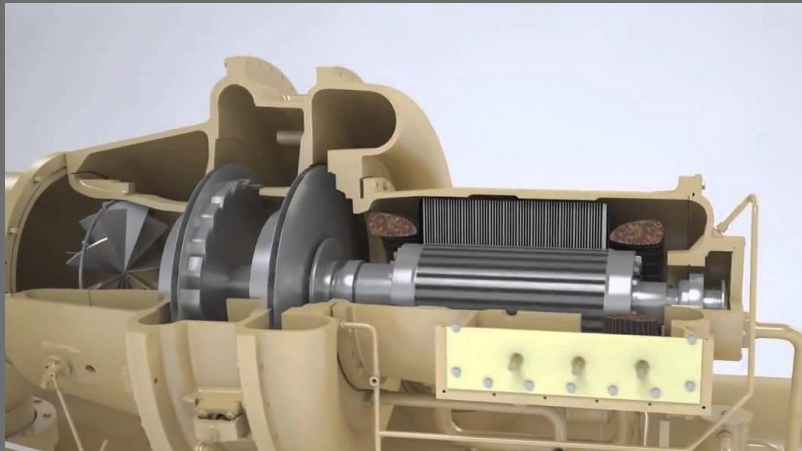
Chillers are classified by how the heat is rejected and then compressor type.

- Water Cooled
  - Centrifugal
  - Screw
  - Scroll
- Air Cooled
  - Centrifugal
  - Screw
  - Scroll

# Refrigeration Cycle Basics



# Water Cooled Centrifugal Chillers





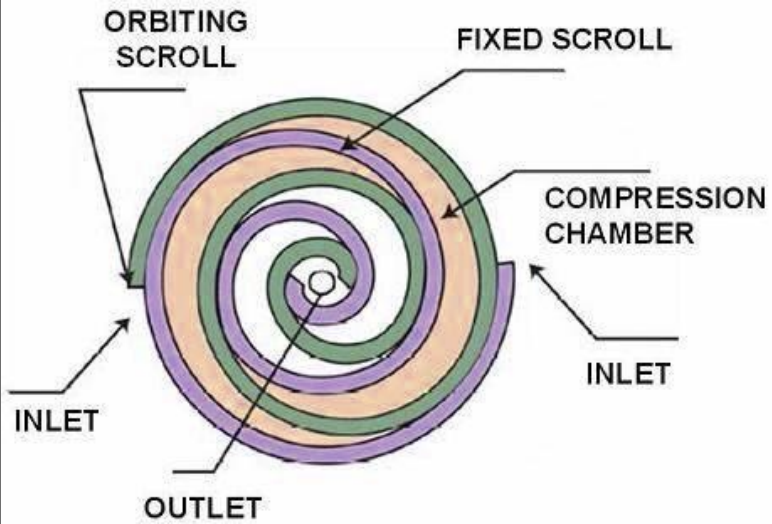
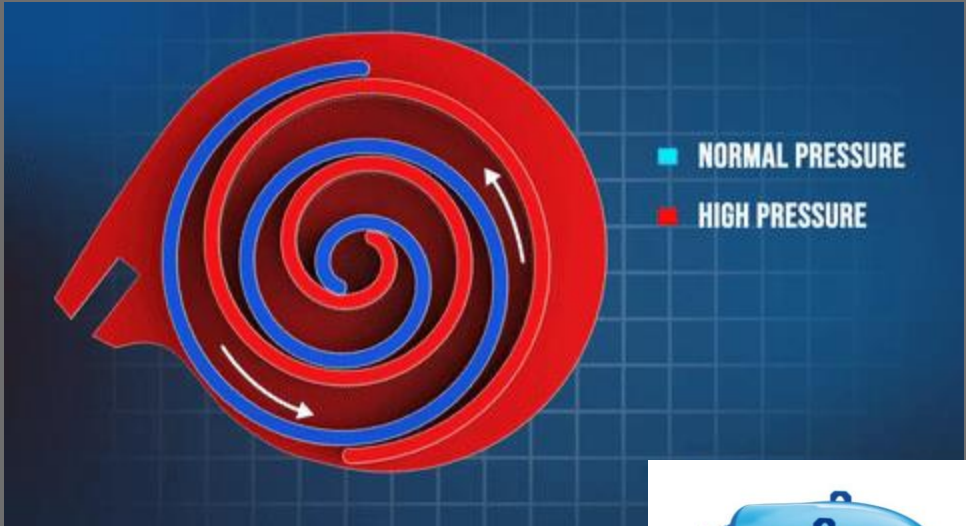
# Water Cooled Centrifugal Chillers



# Water Cooled Scroll Chillers



# Water Cooled Scroll Chillers

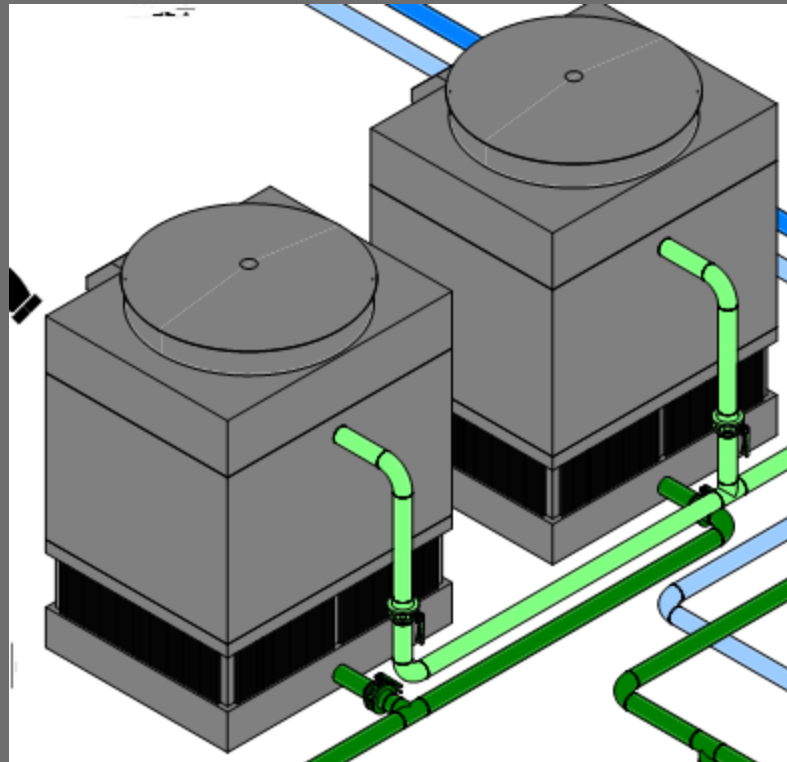


# Air Cooled Chillers

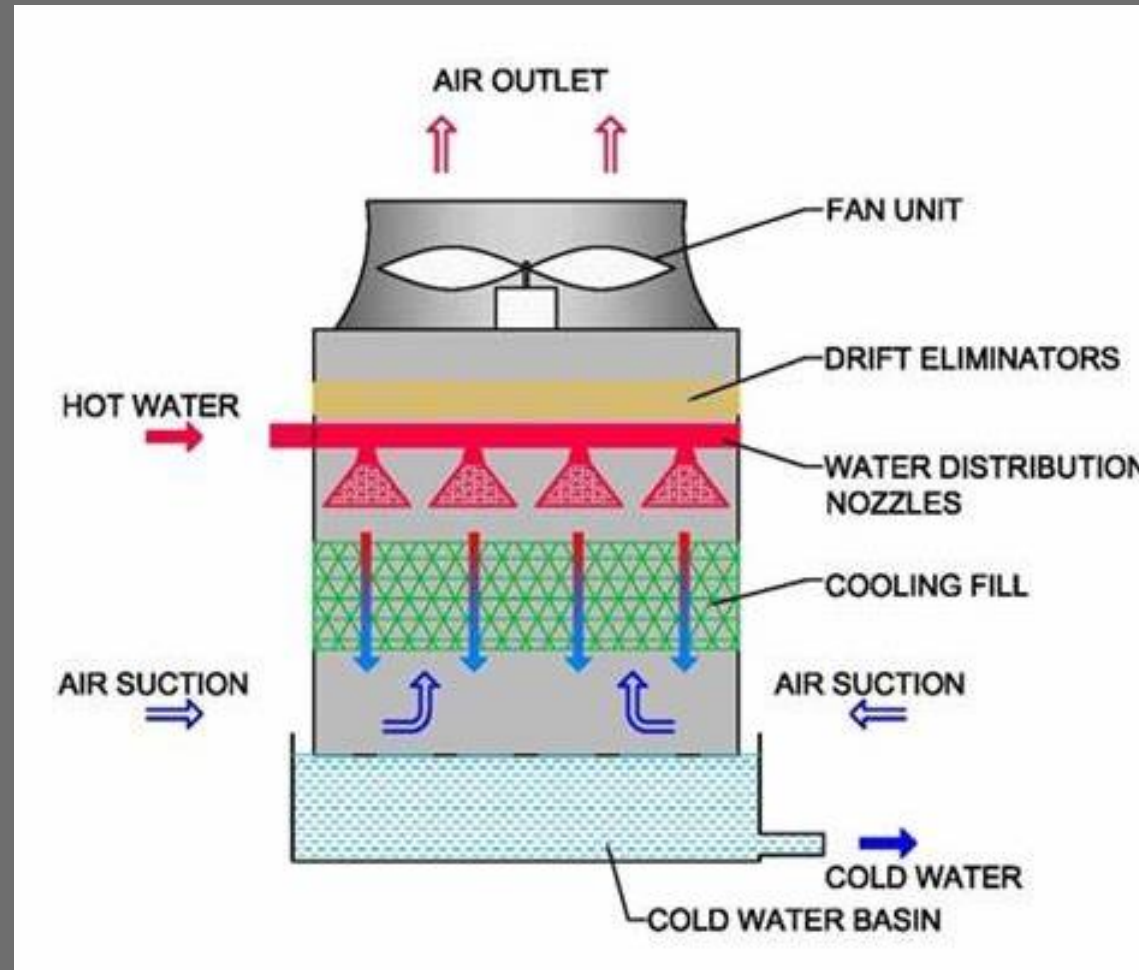


# What Rejects the Heat?

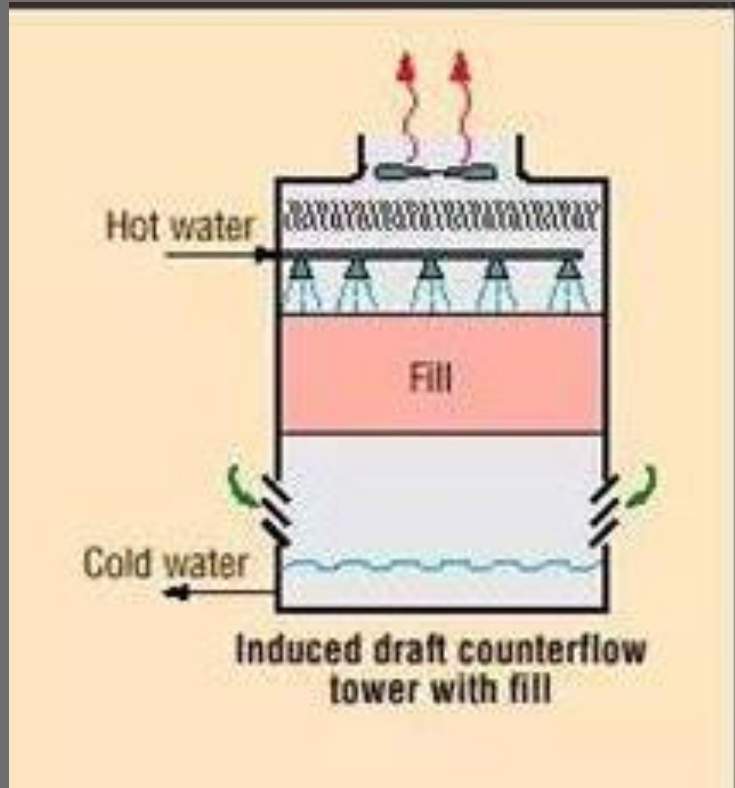
## THE COOLING TOWER



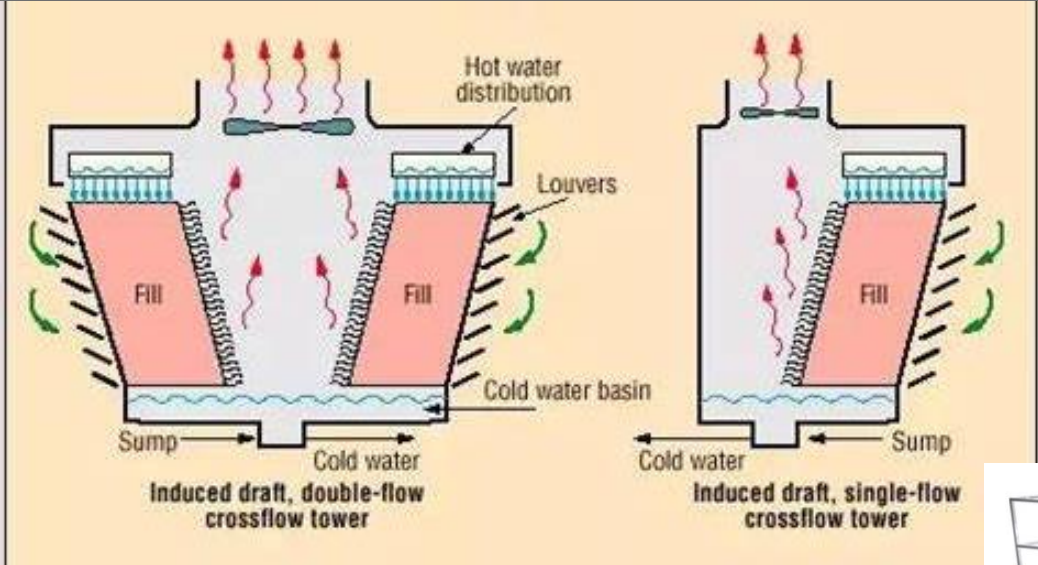
# Cooling Tower Basics



# Cooling Towers



# Cooling Towers

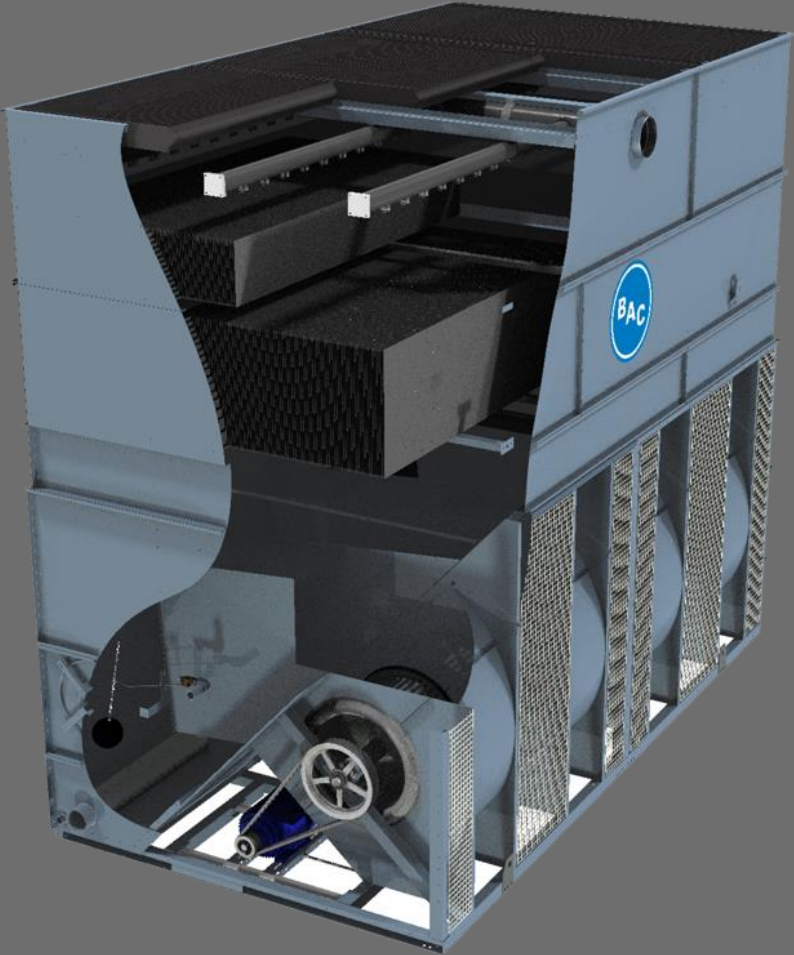
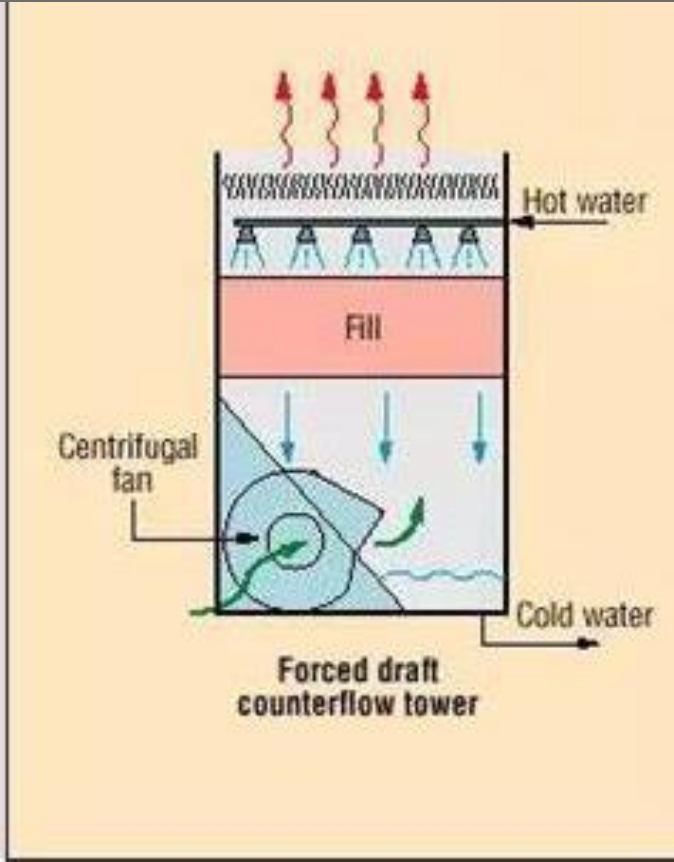




# Cooling Towers

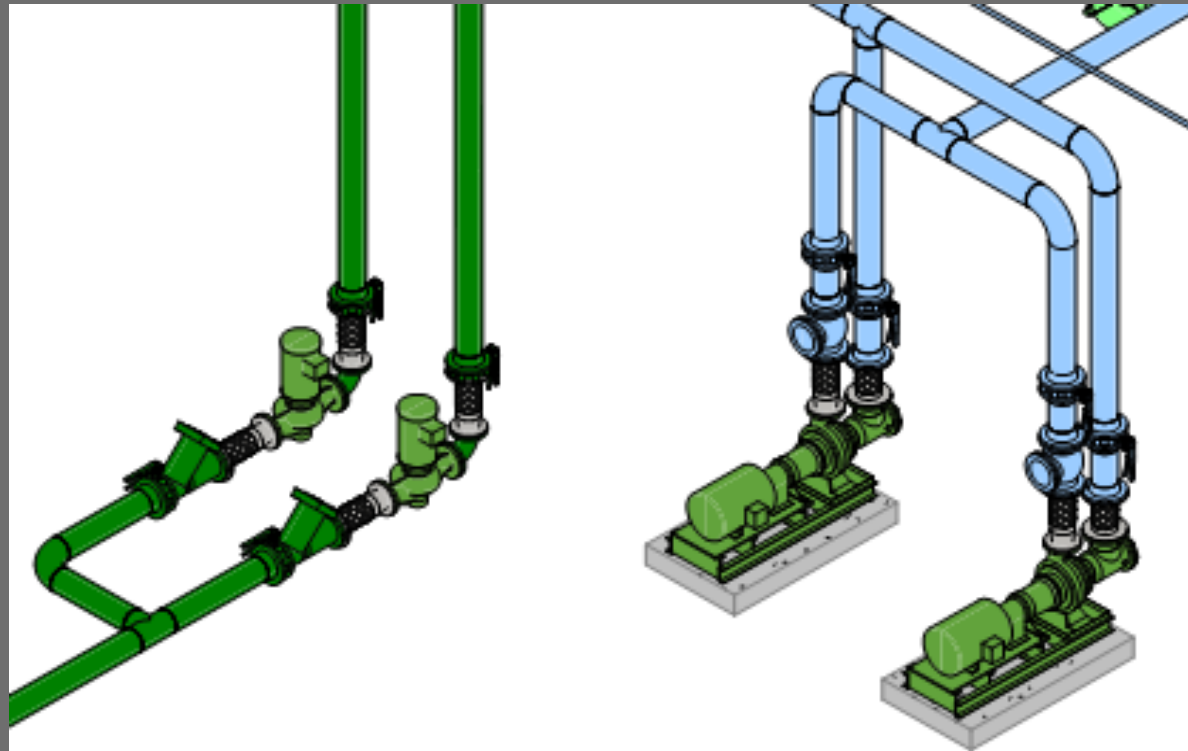


# Cooling Towers



# What Moves the Fluid Around?

## PUMPS



# Pumps

BASE MOUNTED



INLINE



# Pumps

## BASE MOUNTED



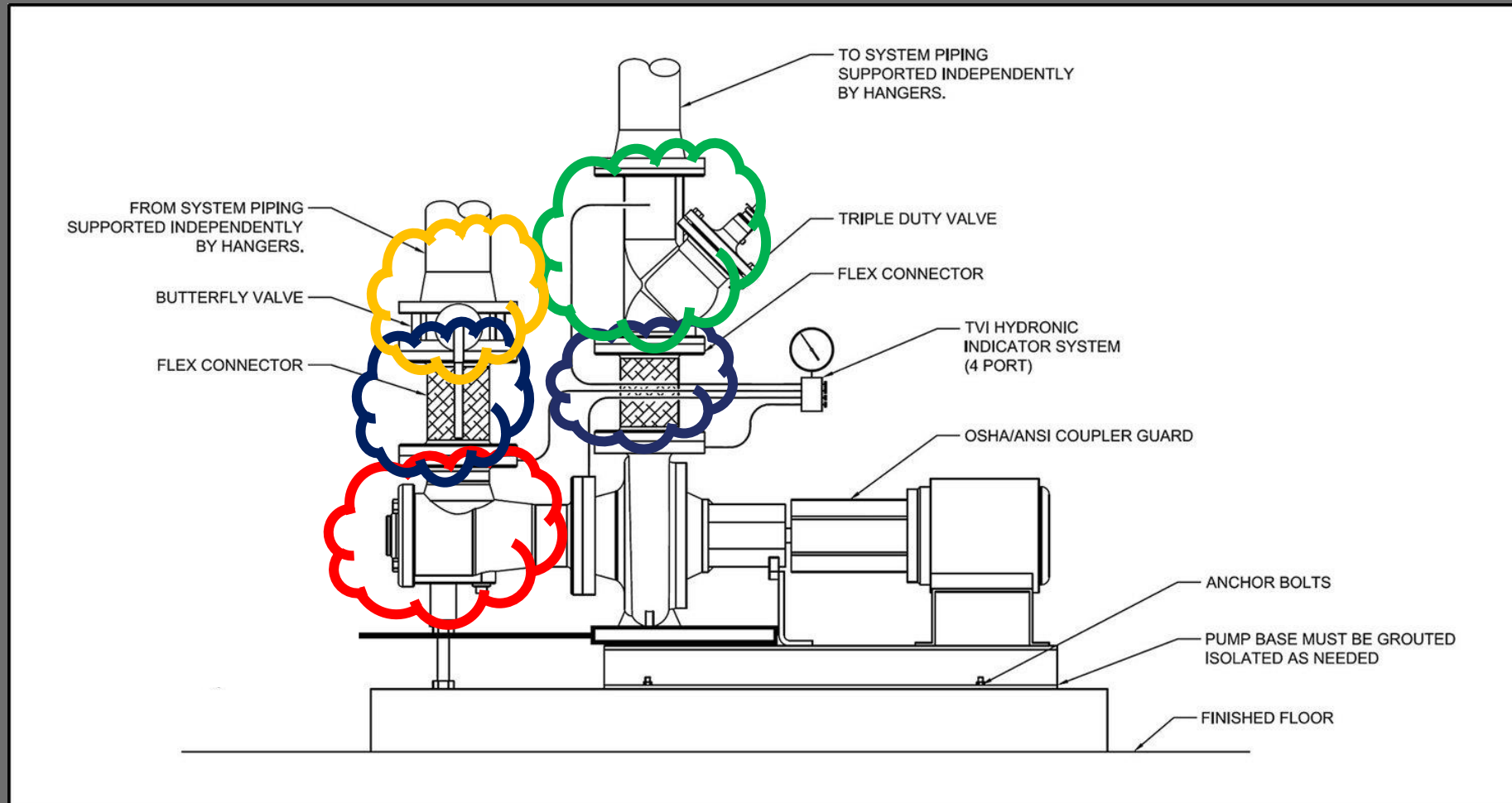
# Pumps

## PUMP OPERATION

Parallel – Pumps operate simultaneously

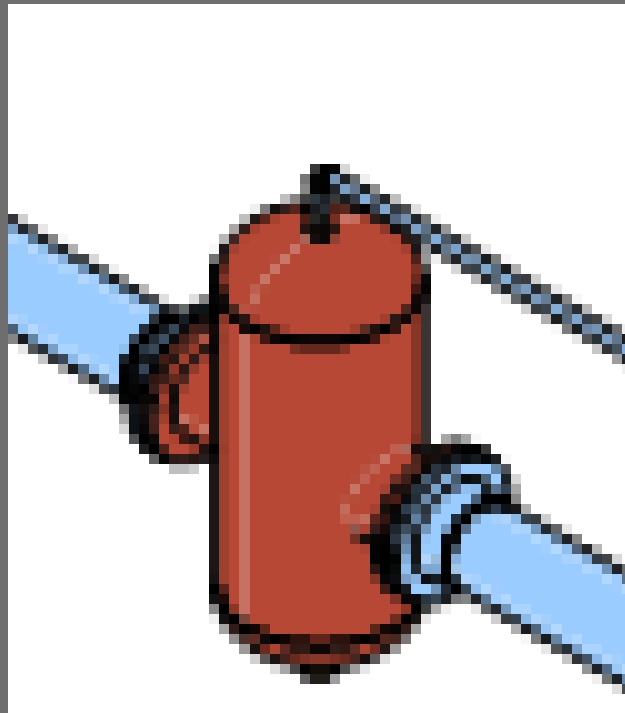
Duty Stand-By or Lead Lag – One pump operates - Pumps operate either or

# Pump Accessories



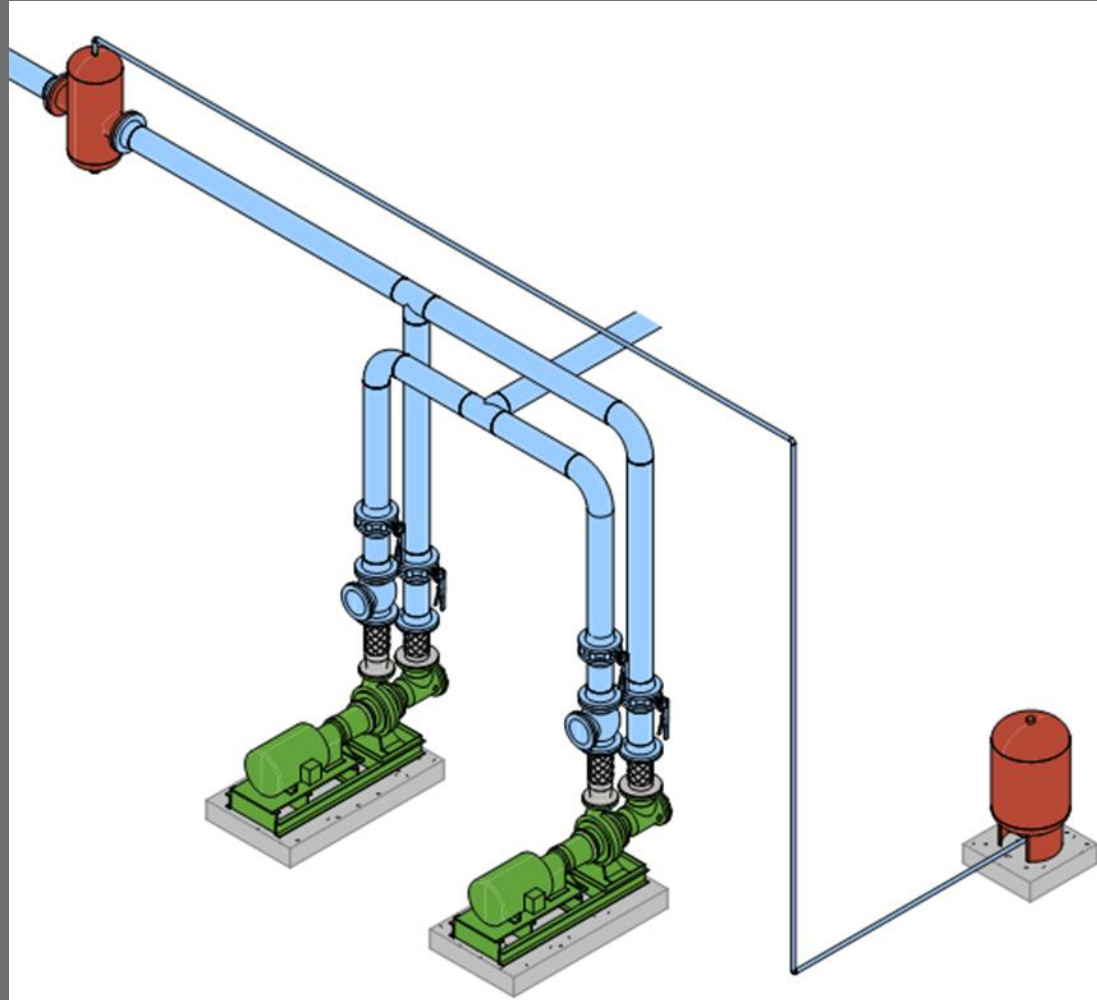
# What Eliminates Air in the System?

## AIR SEPARATOR





# Air Separators



# Air Separators

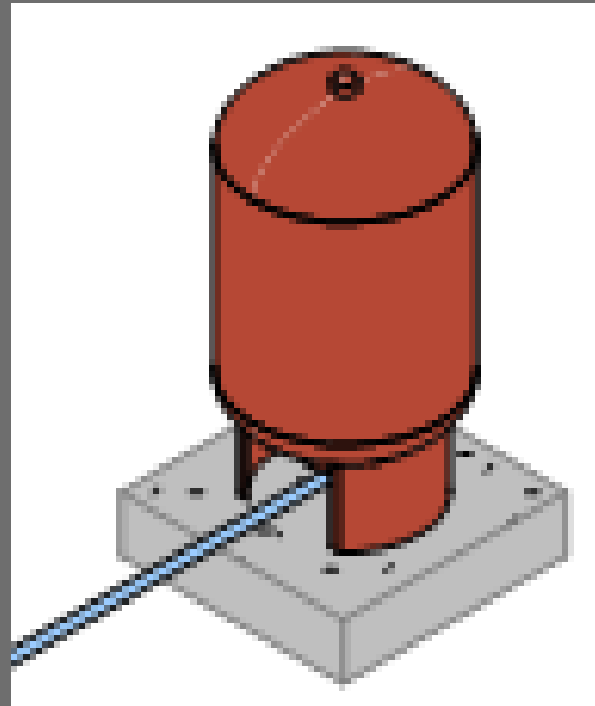


# Air Separators

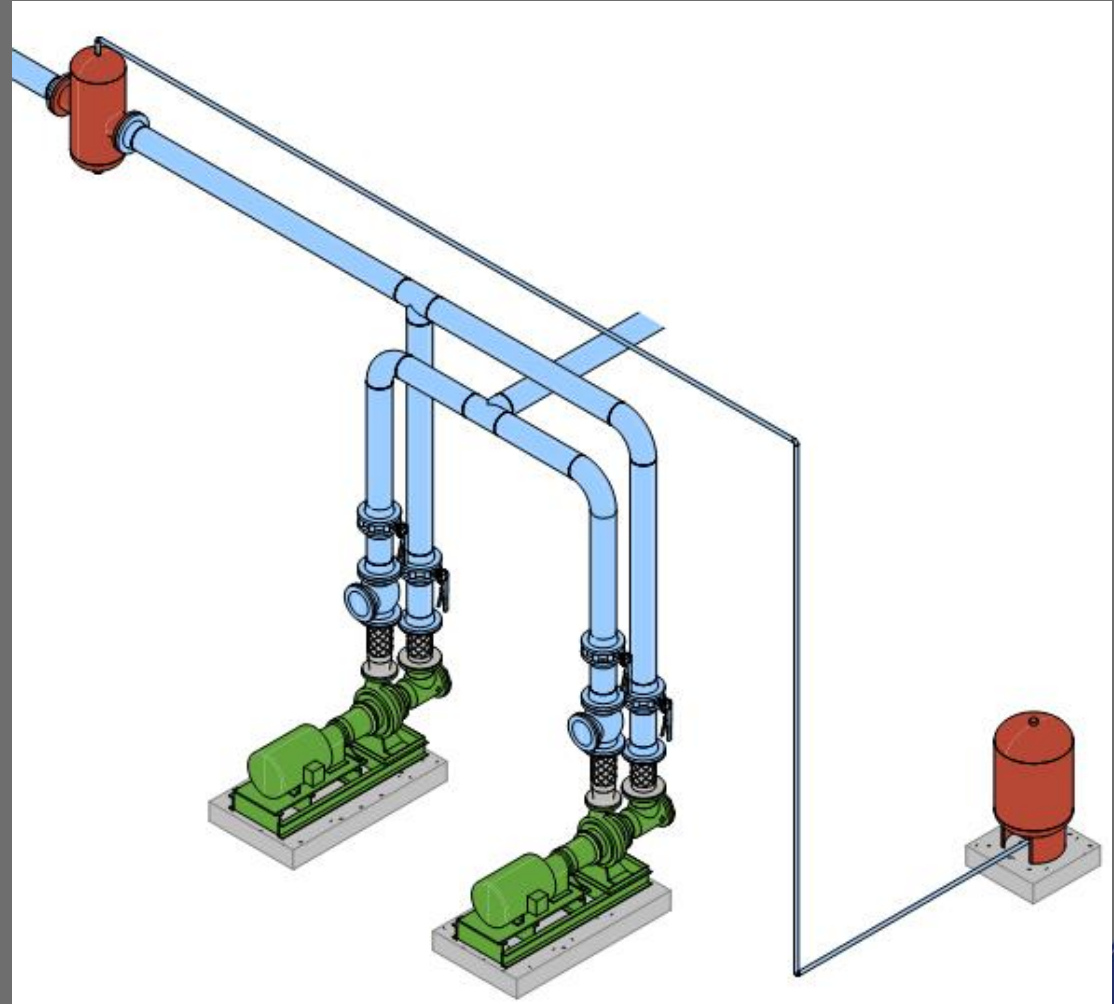


# How do we Deal with Expansion of Water?

## EXPANSION TANK



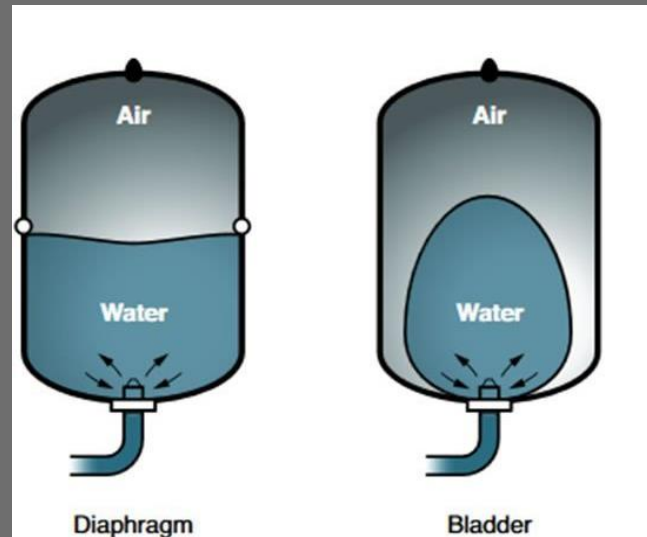
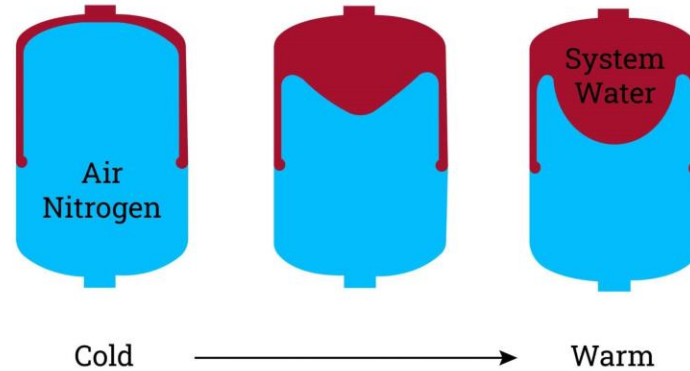
# Expansion Tanks



# Expansion Tanks



Diaphragm Expansion Tank

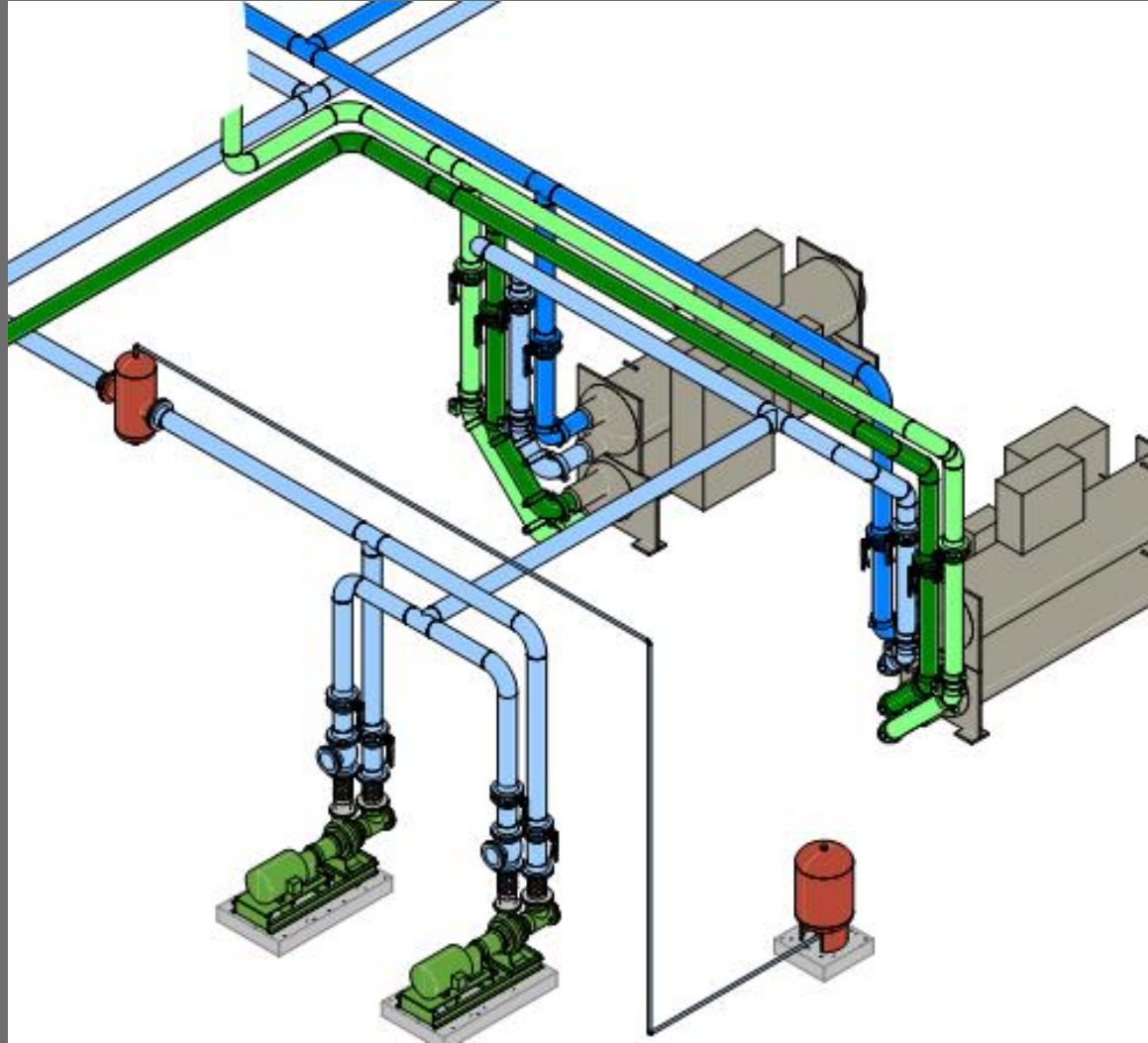


# How are system piped?

Two designs:

1. Primary
2. Primary-Secondary

# Primary Pumping Systems

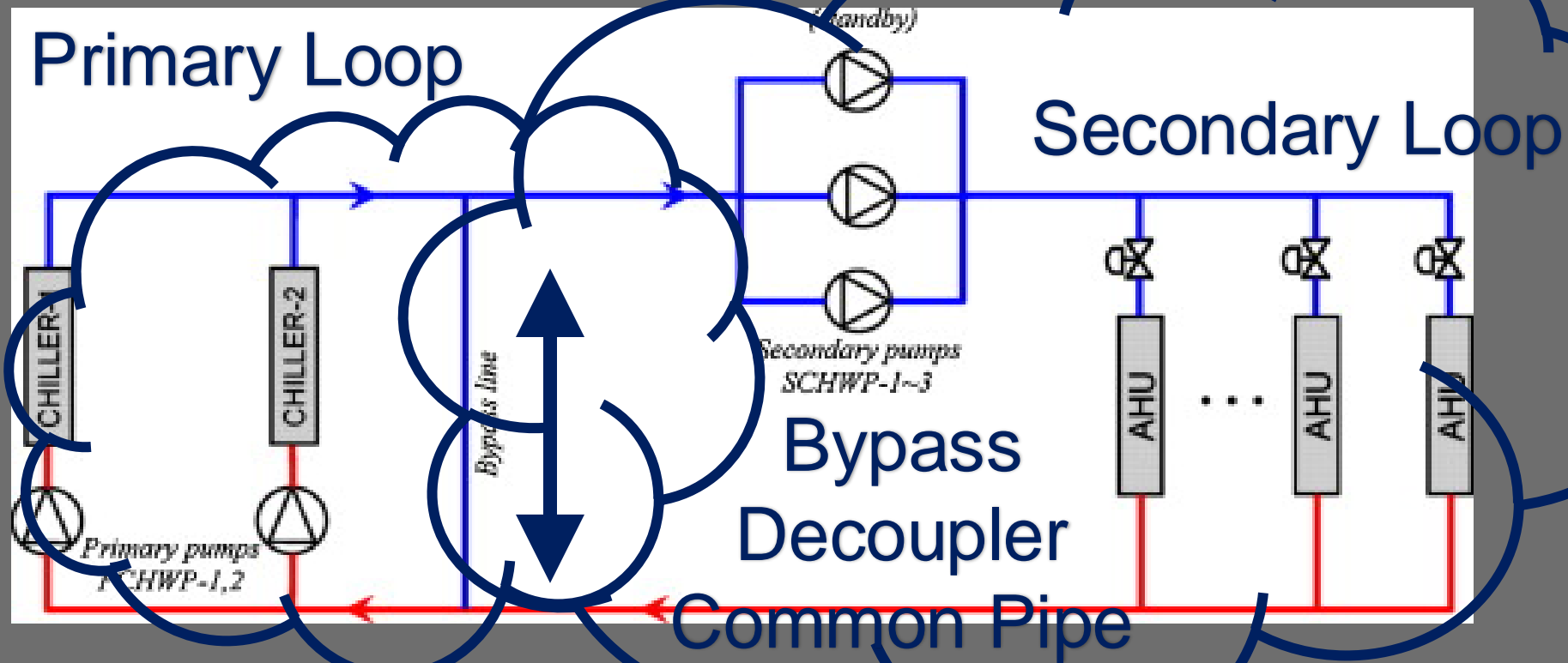




# Primary Pumping Systems



# Primary-Secondary Pumping Systems



# Installed? What next?

System must be maintained

## Chiller

Tube Punching - Winter  
Interior Oil Changes  
Exterior Oil Changes  
Amp Draws  
Safety Points

## Pumps

Lubrication  
Coupler Check  
"Sounds"  
Amp Draws

## Chemical Treatment

Hardness Testing  
Sediment Check  
Fluid Levels  
Dosing Pump Checks

## Tower

Drain Down  
Media Cleaning  
Belt Motors  
Amp Draws  
Valve Actuation



**Questions?**