TYLER HOLMAN

North Mechanical Contracting, Inc.

Project Executive

KURT VOSS

Integrated Facility Services

Vice President

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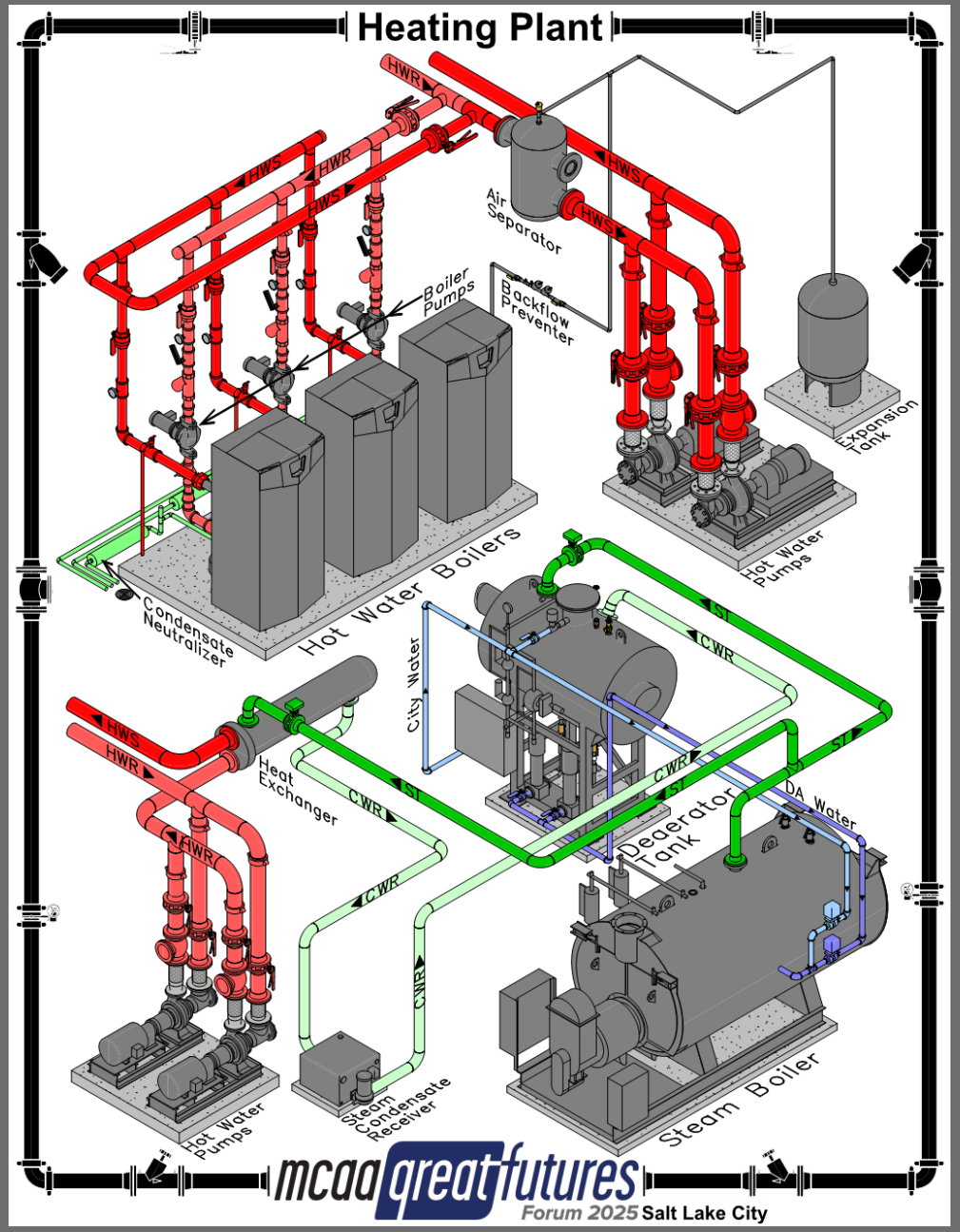
Heating Plant
HWR
HWS
HWR
HWS
HWS
HWS
Air Separator
Backflow Preventer
Boiler Pumps
Expansion Tank
Hot Water Pumps
Condensate Neutralizer
Hot Water Boilers
City Water
CWR
ST
CWR
ST
ST
DA Water
Deaerator Tank
HWS
HWR
Heat Exchanger
CWR
HWR
CWR
CWR
Steam Condensate Receiver
Hot Water Pumps
Steam Boiler
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WHAT IS THE PURPOSE OF A HEATING PLANT?

- Simply put - To produce heat for use within the building.
- Heat can be produced in many forms but most commonly it is either hot water, steam, or refrigerant.

MAIN COMPONENTS OF A HEATING PLANT?

Hot Water

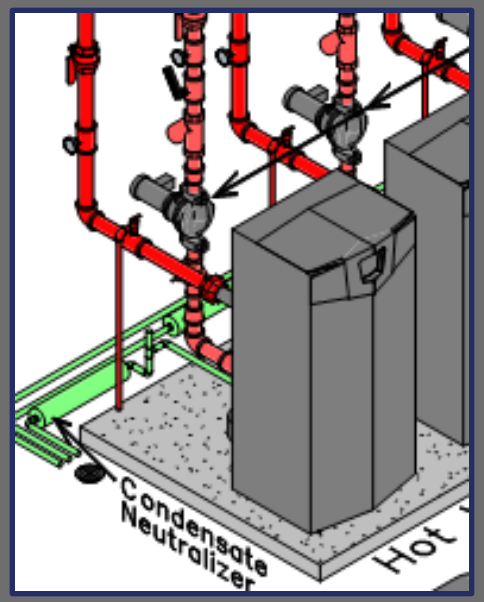
- Boilers
- Pumps
- Air Separator
- Expansion Tank
- Piping

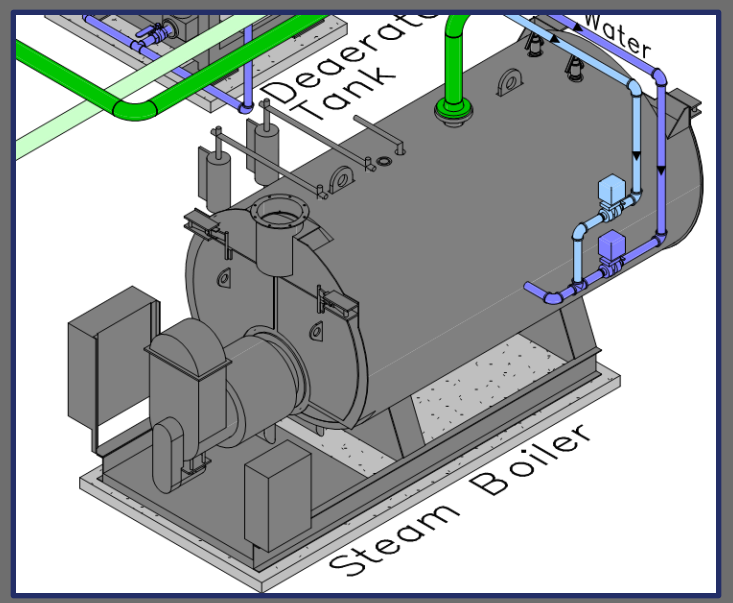
Steam

- Boilers
- Deaerator Tank
- Feed Water System
- Condensate Return System
- Steam to Hot Water Heat Exchanger
- Pumps
- Air Separator
- Expansion Tank
- Piping

LIFE BLOOD OF THE HEATING PLANT

The Boiler





BOILERS

Boilers are classified by what they produce, efficiency and how the fluid or combustion gas passes through the boiler

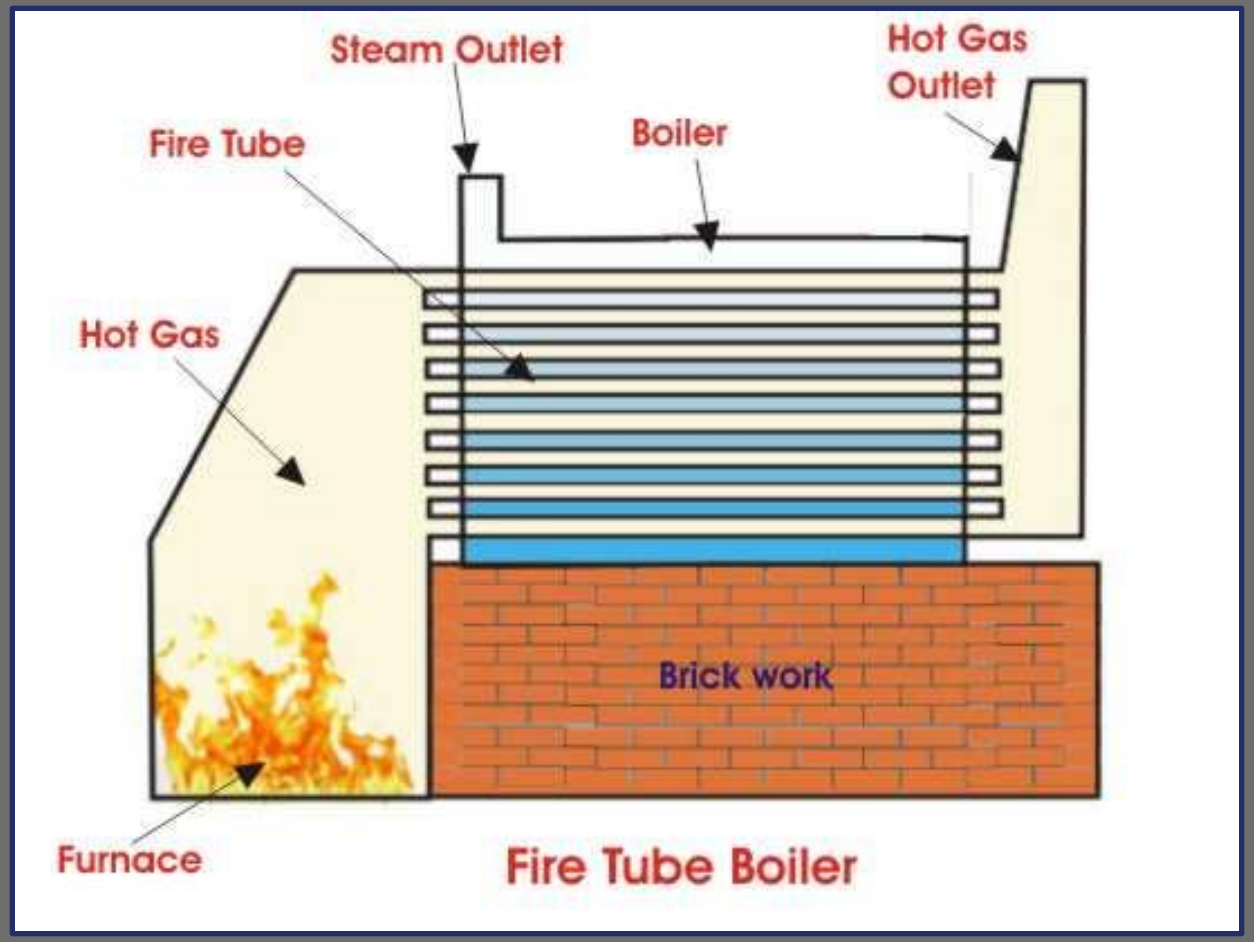
Hot Water Boilers

- Standard Efficiency ~80%
- High Efficiency Condensing 90%+
- Cast Iron Sectional
- Water Tube
- Fire Tube
- Electric

Steam Boilers

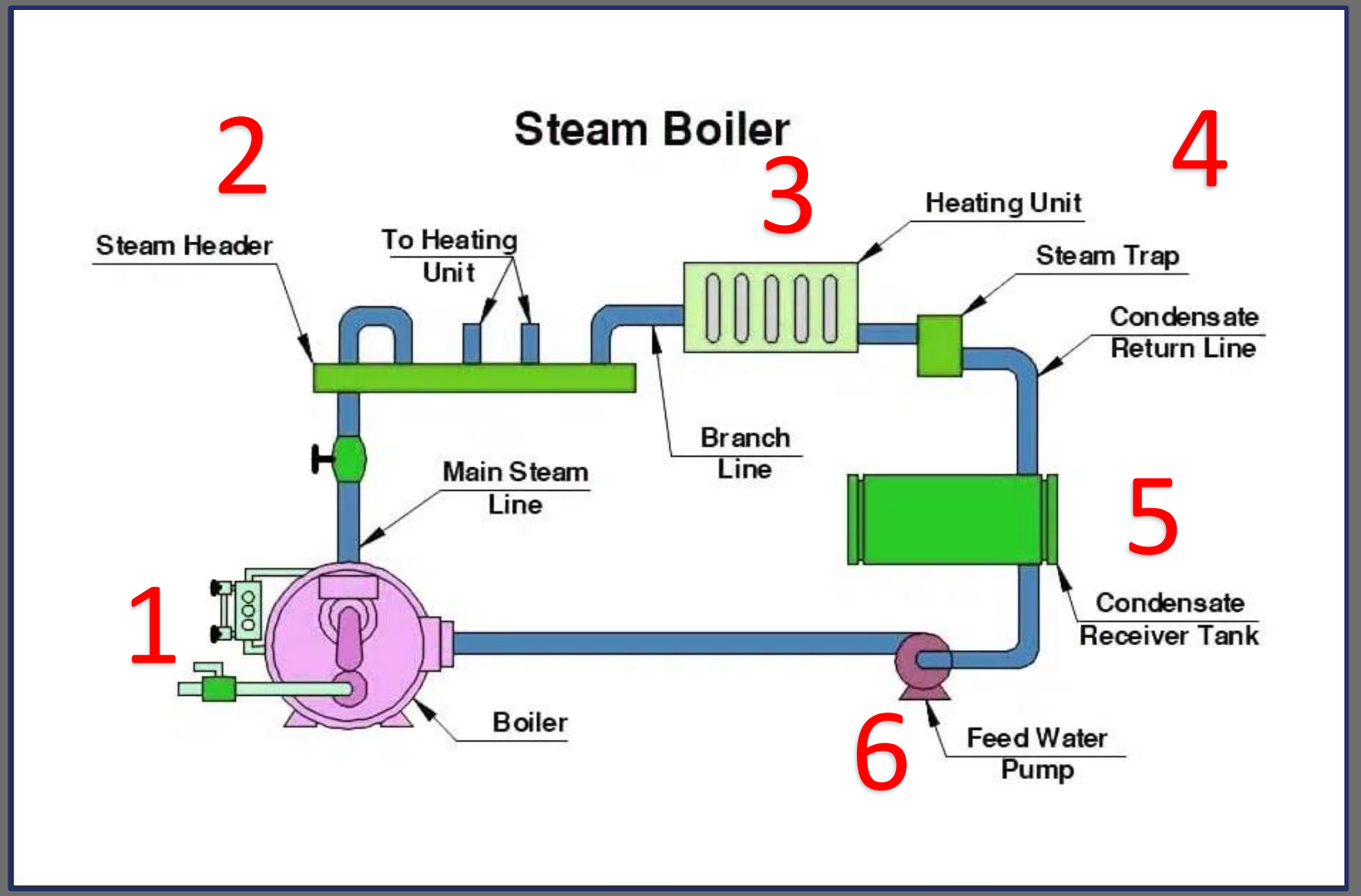
- Standard Efficiency ~80% +
- Cast Iron Sectional
- Water Tube
- Fire Tube

WHY STEAM?



Back in the day it was simple with few moving parts and no electricity required!

STEAM SYSTEMS



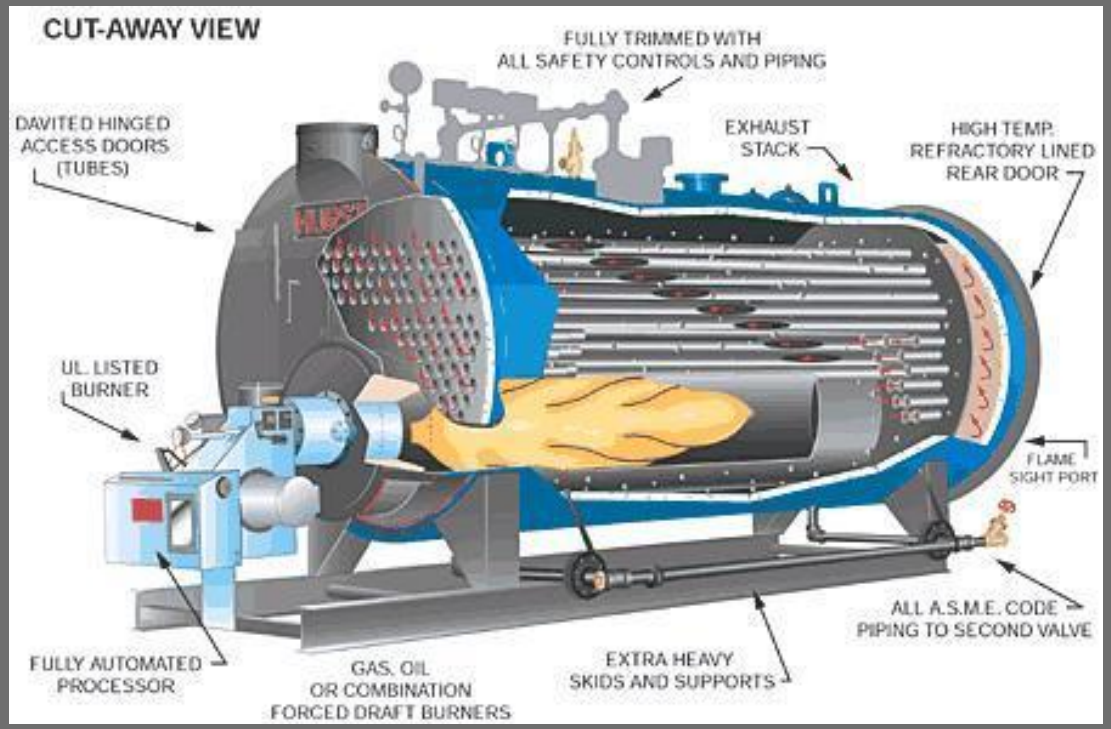
CAST IRON SECTIONAL STEAM BOILER

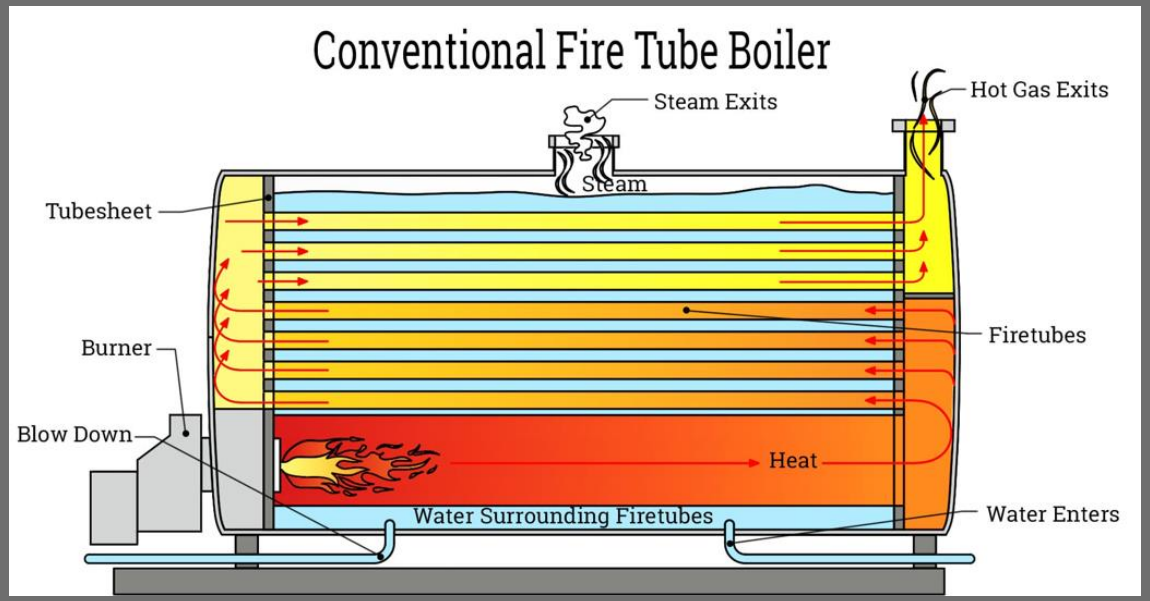
WATER TUBE STEAM BOILER

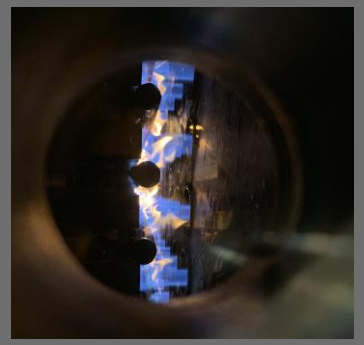
FIRE TUBE STEAM BOILER

FIRE TUBE STEAM BOILER

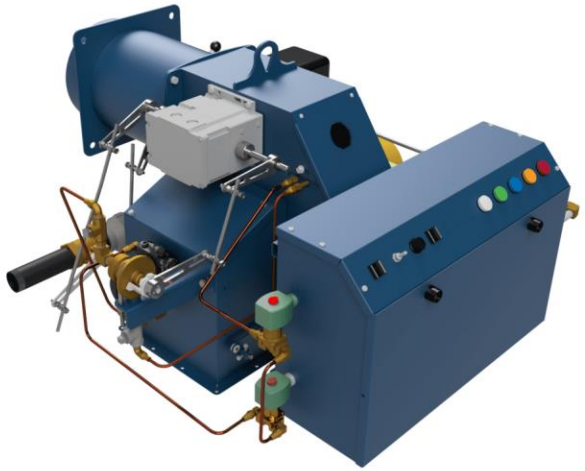
3 Pass Boiler

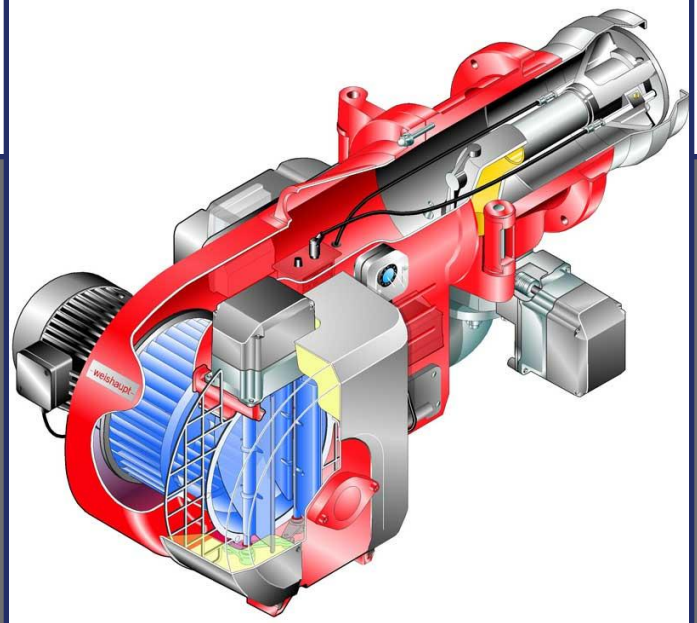




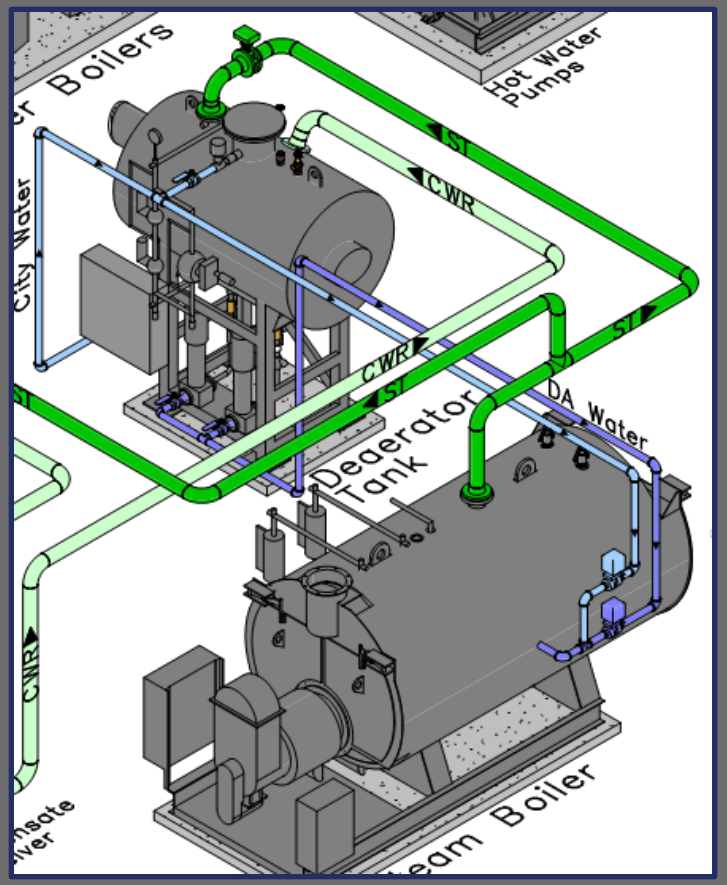


BURNER MODULES

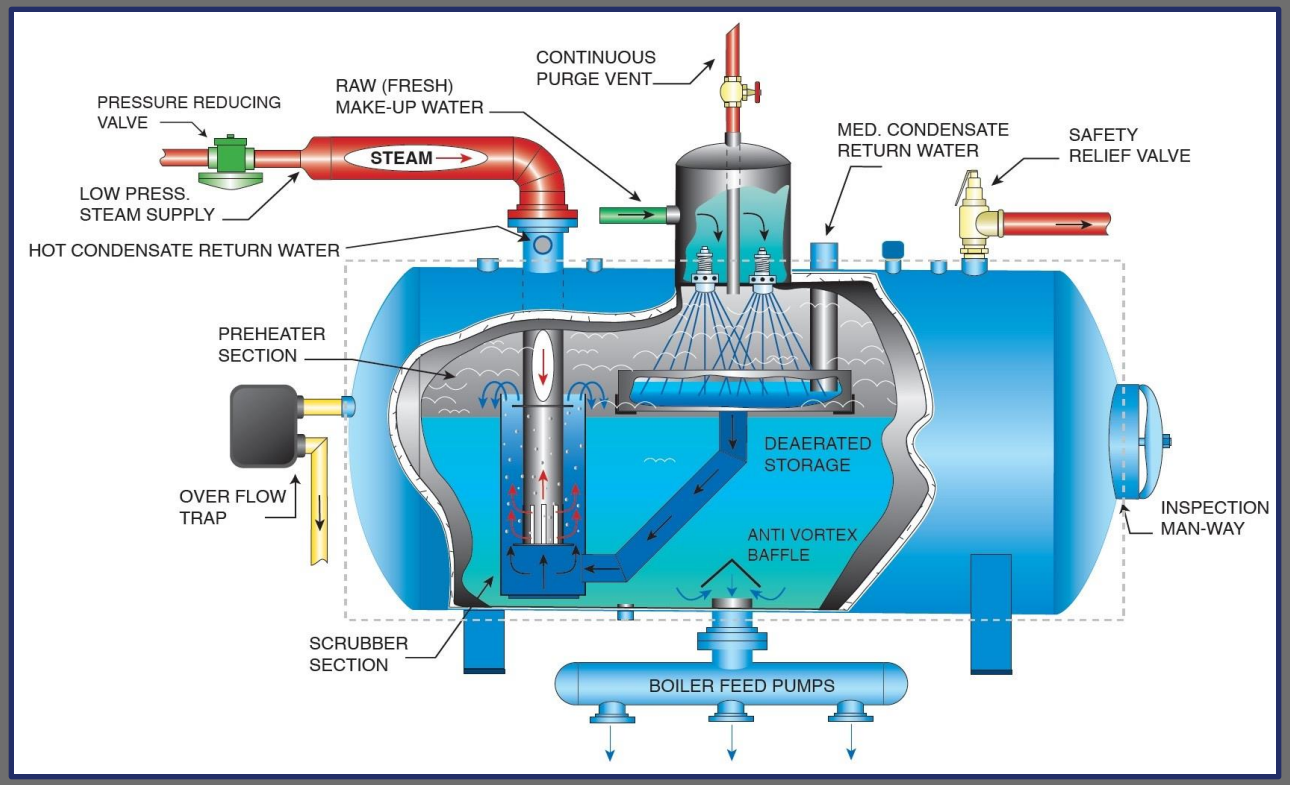




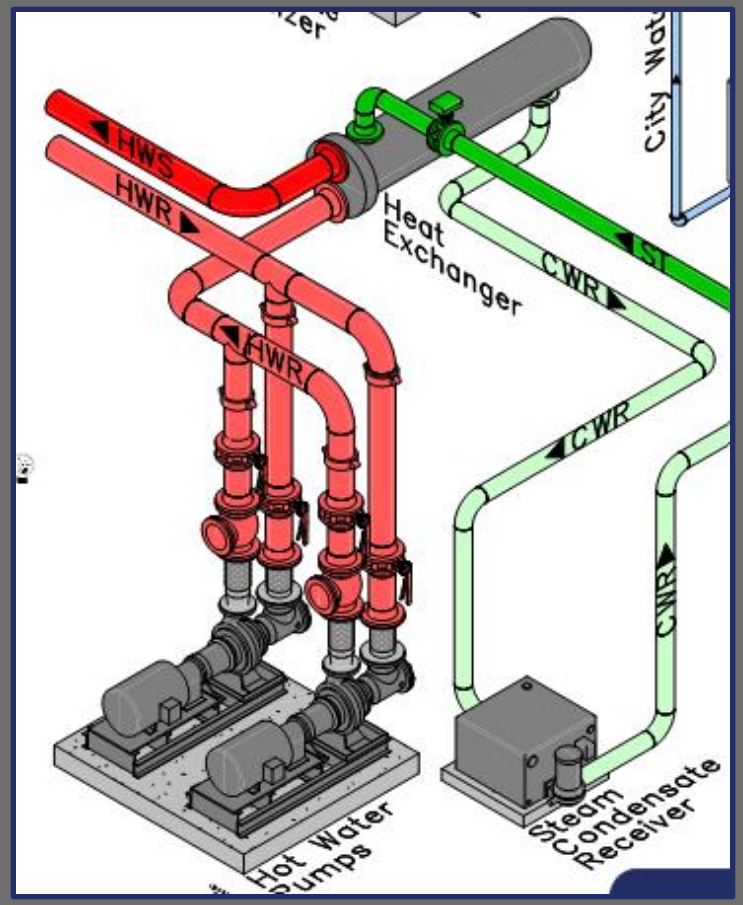
HOW IS WATER SUPPLIED TO THE STEAM BOILER?



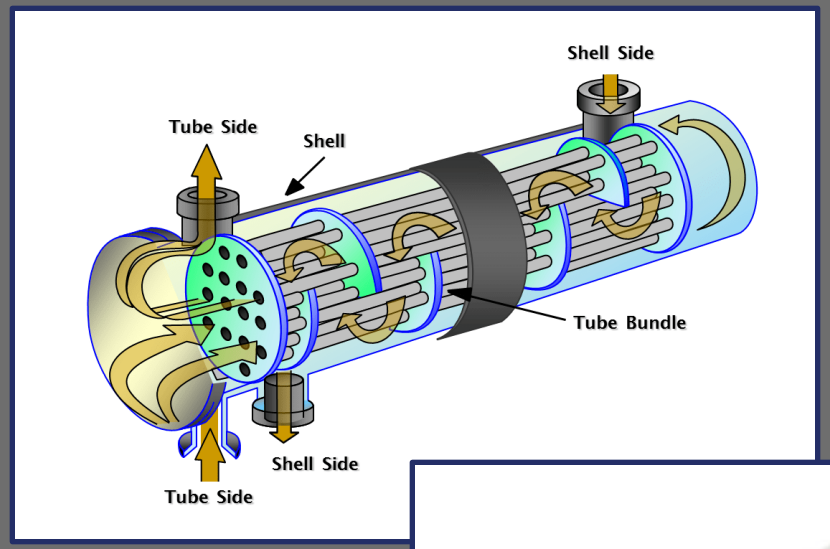
DEAERATOR TANK

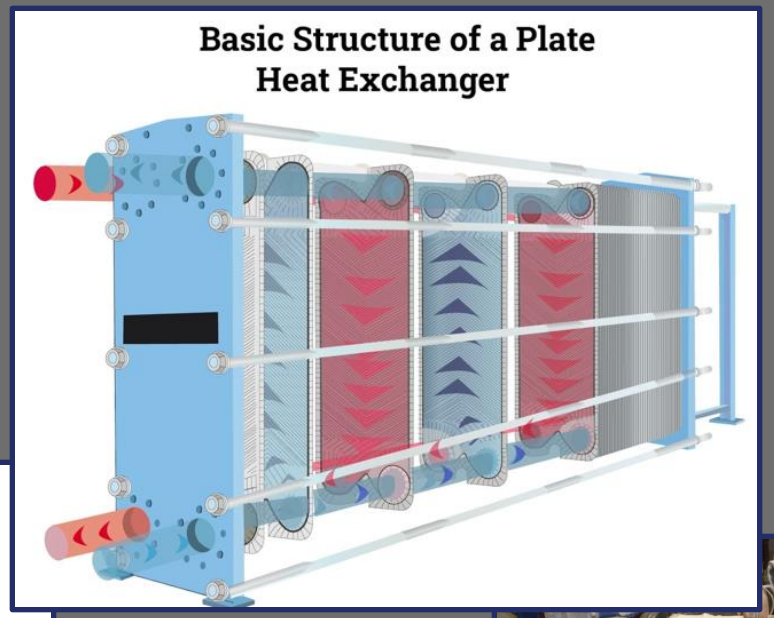


WHAT DO WE DO WITH THE STEAM?

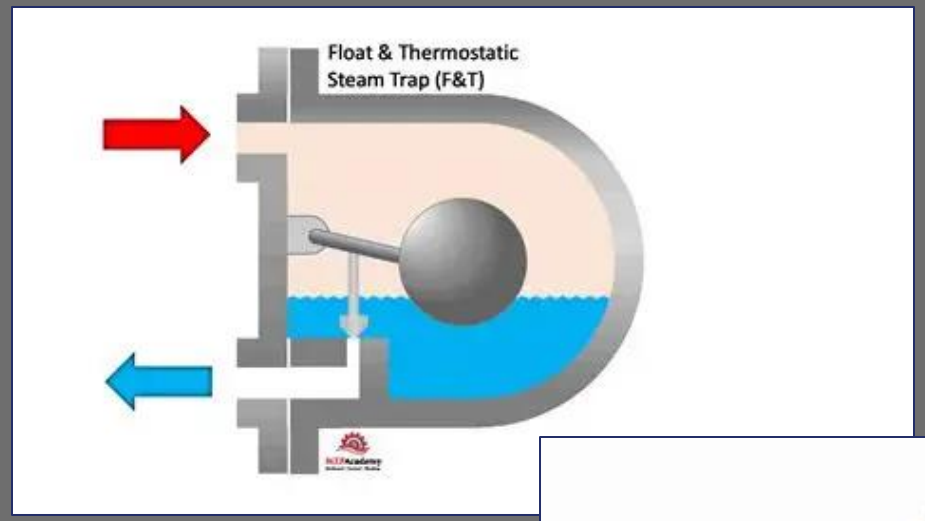


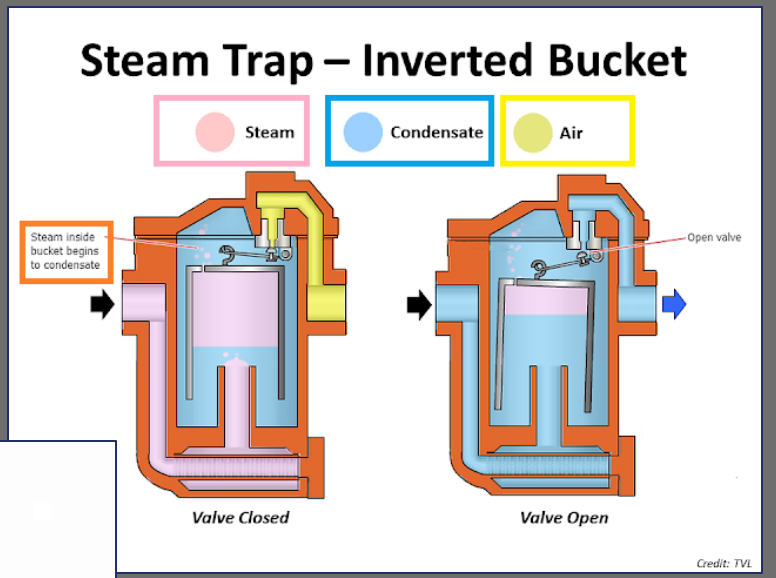
STEAM EQUIPMENT



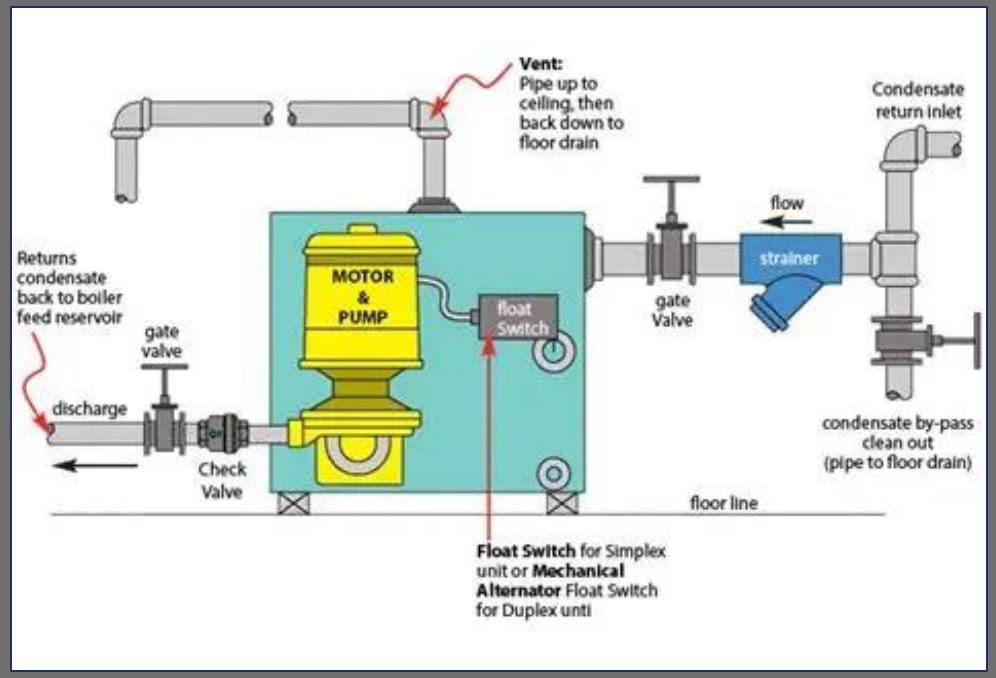


STEAM TRAPS


Float & Thermostatic
Steam Trap (F&T)


Steam Trap – Inverted Bucket
Steam
Condensate
Air
Steam inside bucket begins to condensate
Open valve
Valve Closed
Valve Open
Credit: TVL

CONDENSATE RECEIVER AND PUMPS



OTHER STEAM COMPONENTS

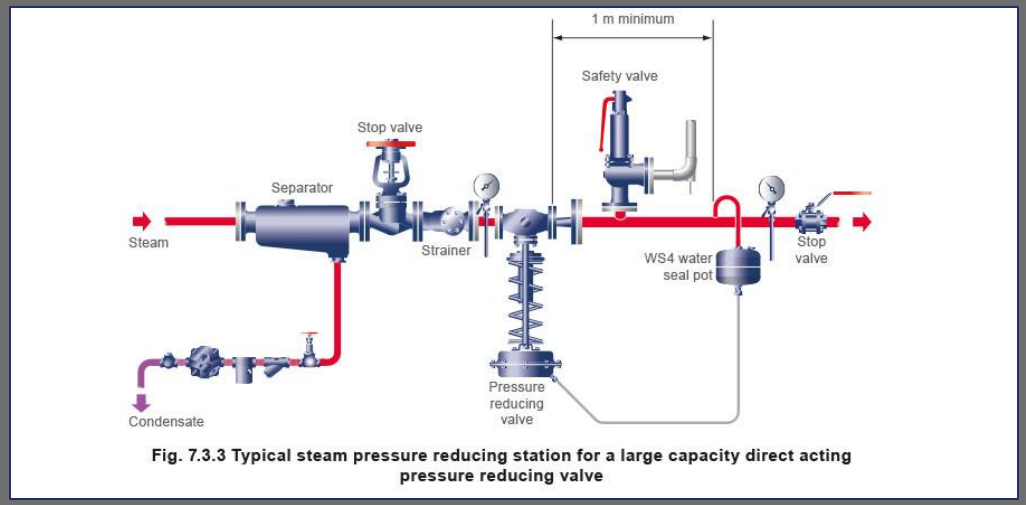
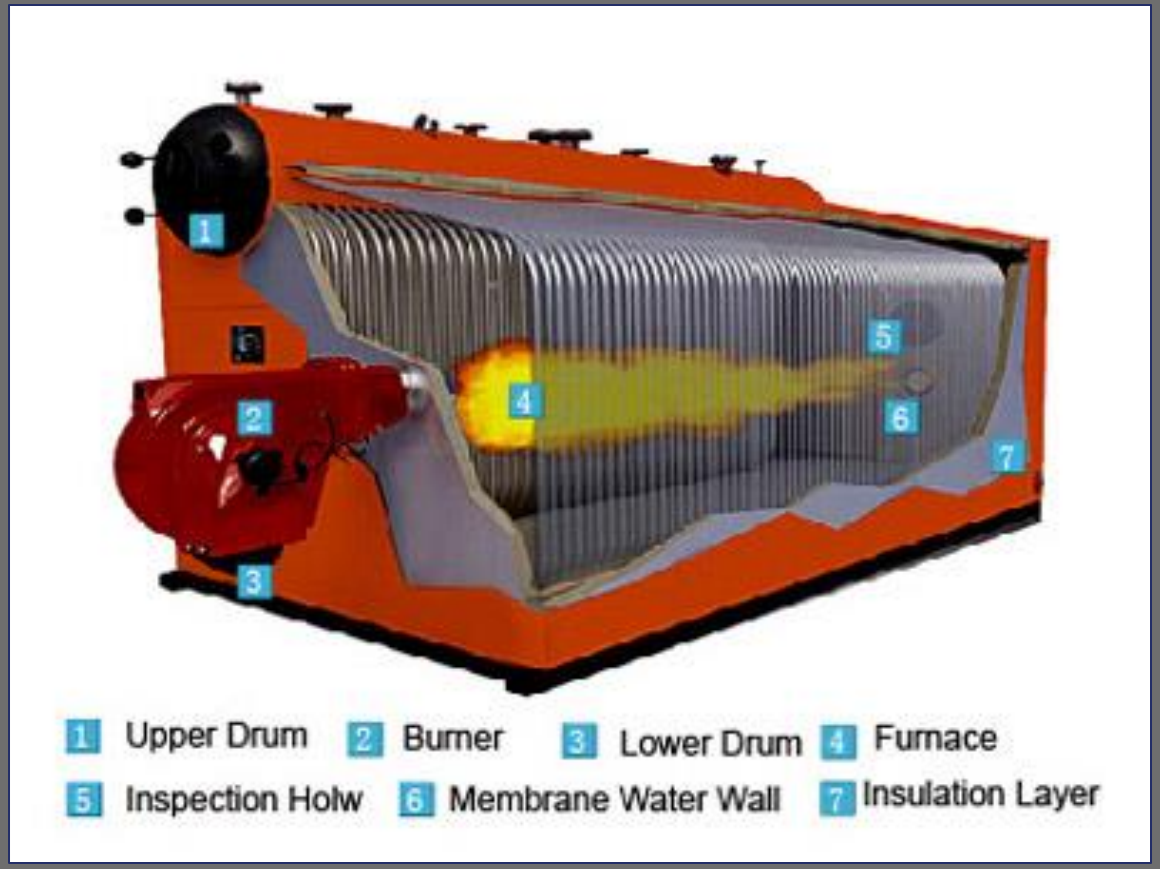


Fig. 7.3.3 Typical steam pressure reducing station for a large capacity direct acting pressure reducing valve

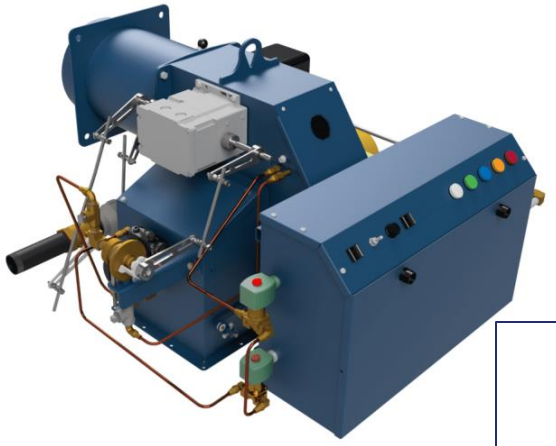
CAST IRON SECTIONAL HOT WATER BOILER

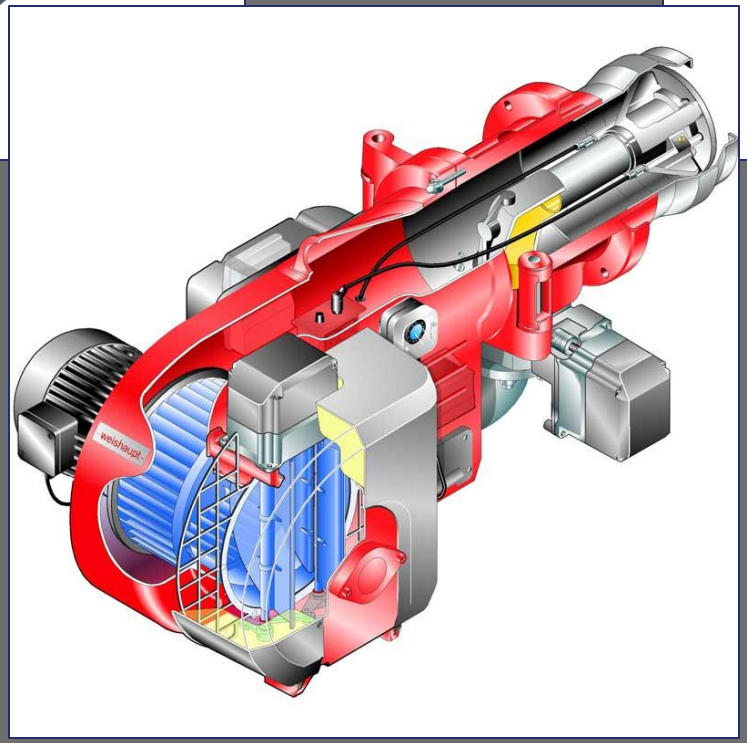
WATER TUBE HOT WATER BOILER



FIRE TUBE HOT WATER BOILER

BURNER MODUELS

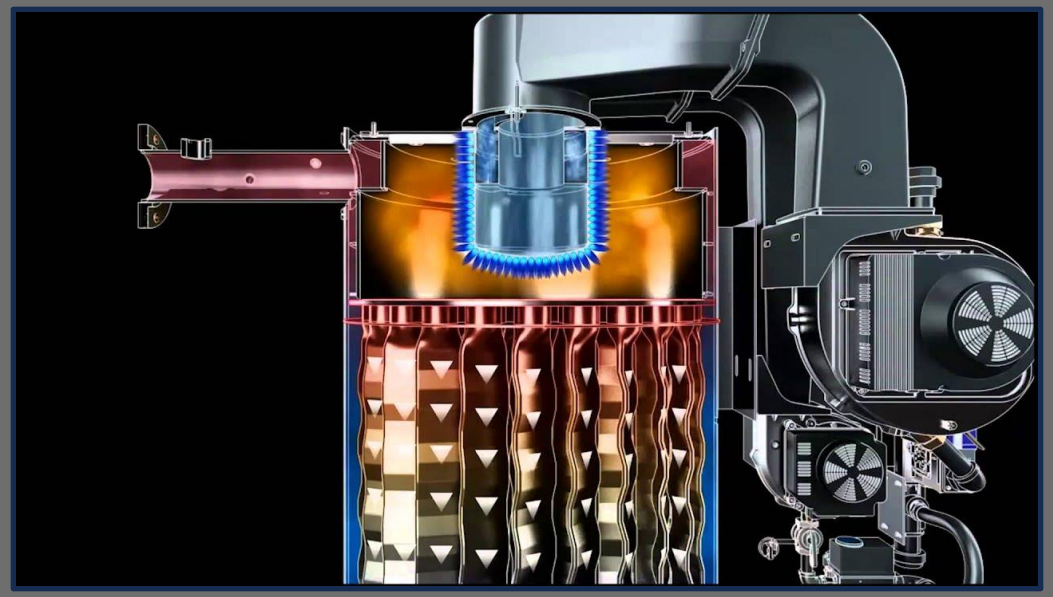




PACKAGED ECONOMICAL HOT WATER BOILER

HIGH EFFICIENCY HOT WATER BOILER

Condensing Boilers are available as both Fire Tube and Water Tube Boilers



HIGH EFFICIENCY HOT WATER BOILER

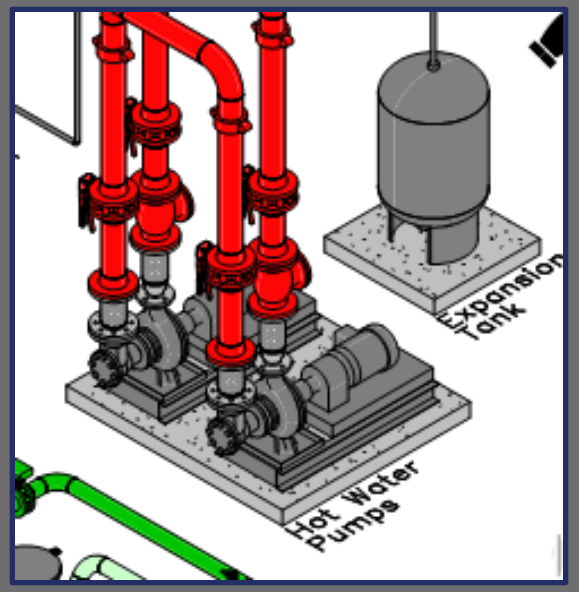
Requires Special Flue Material to handle the corrosive flue gas:

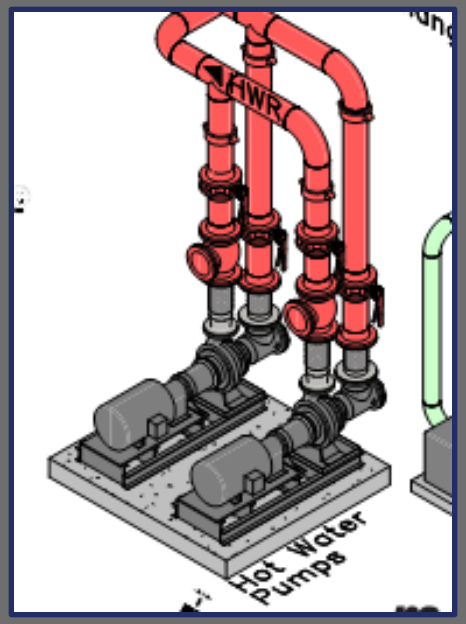
- PVC
- CPVC
- Stainless
- Polypropylene designed for flue gas

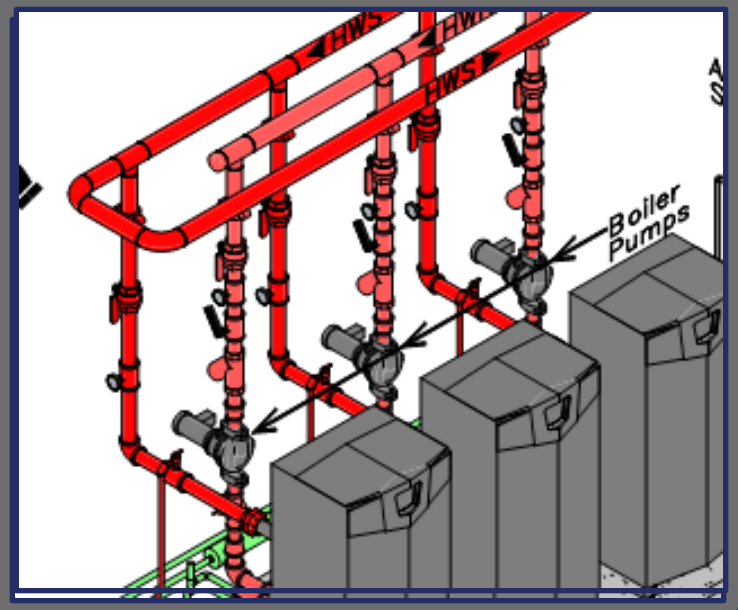
AIR COOLED HOT WATER GENERATORS OR HEAT PUMP CHILLERS

WHAT MOVES THE FLUID AROUND?

Pumps







PUMPS

Base Mounted

Inline

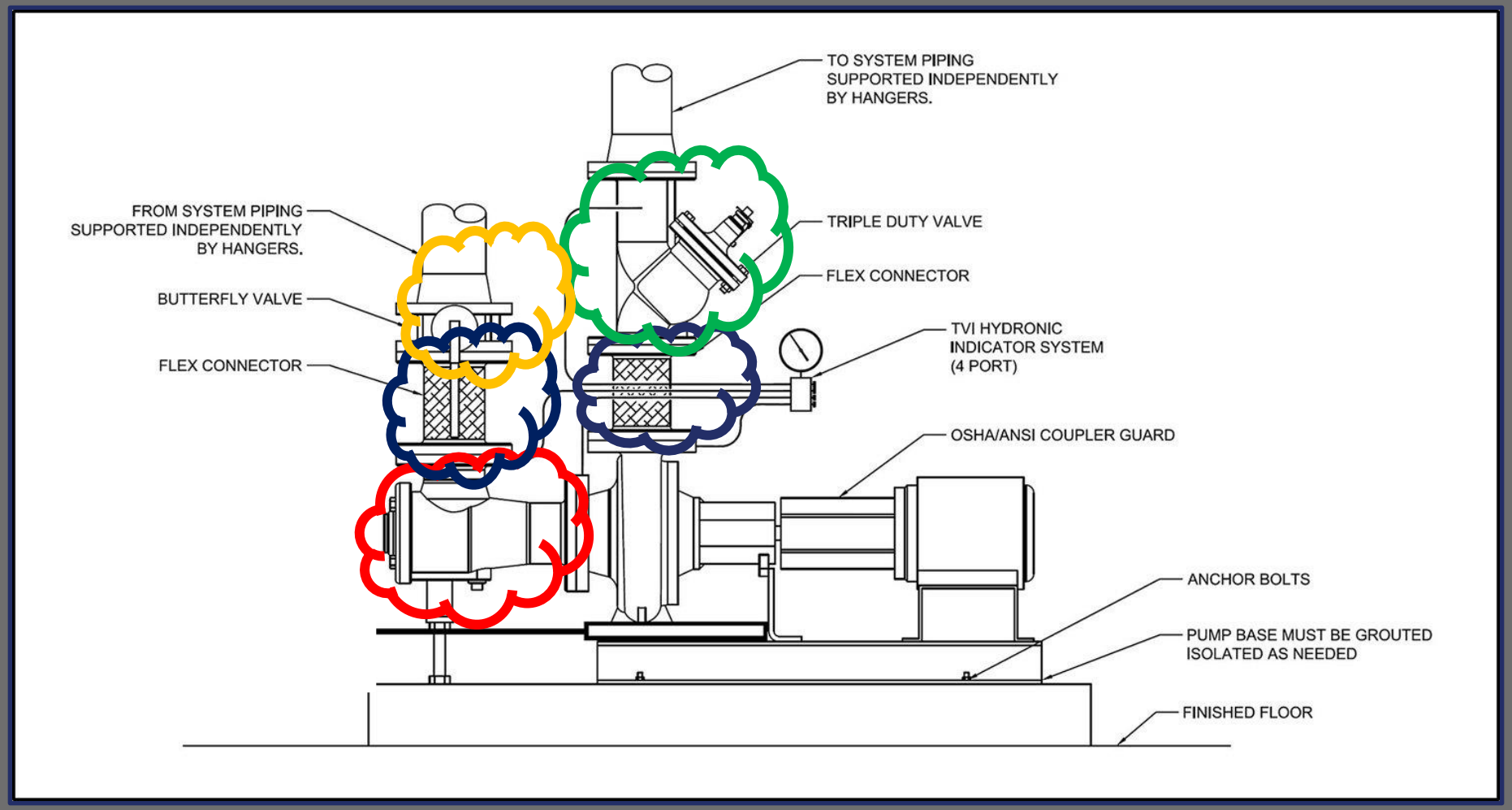
PUMPS

Base Mounted

PUMP OPERATION

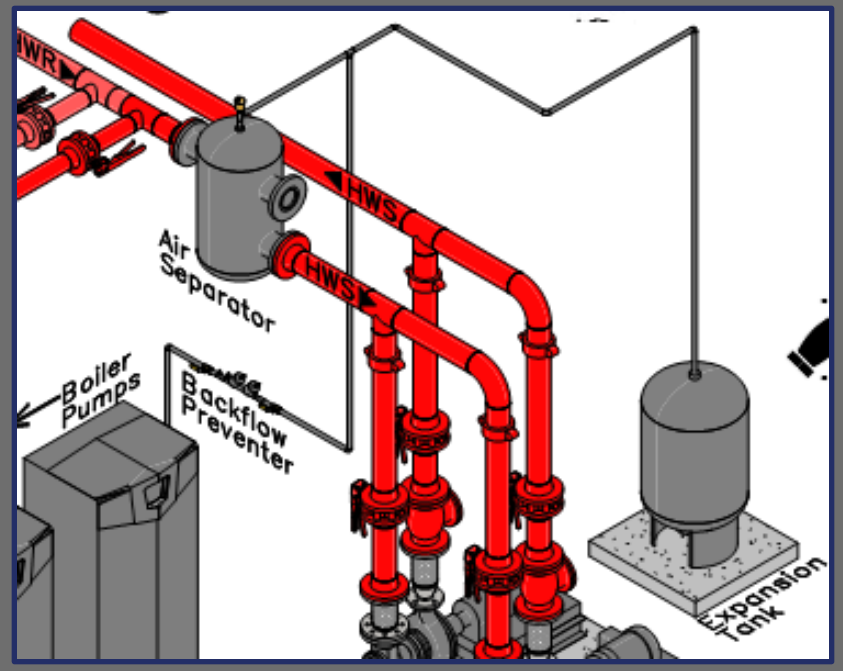
- Parallel –Pumps operate simultaneously
- Duty Stand-By or Lead Lag- One pump operates - Pumps operate either or

PUMP ACCESSORIES



WHAT ELIMINATS AIR IN THE SYSTEM?

Air Separator

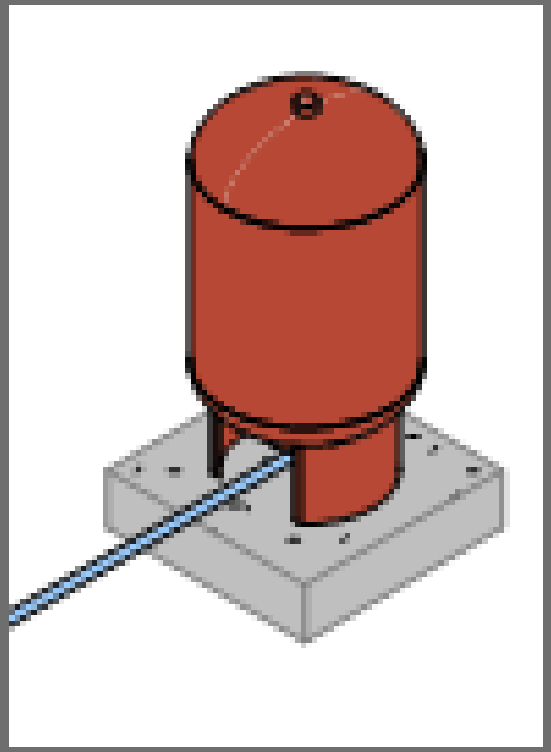


AIR SEPARATORS

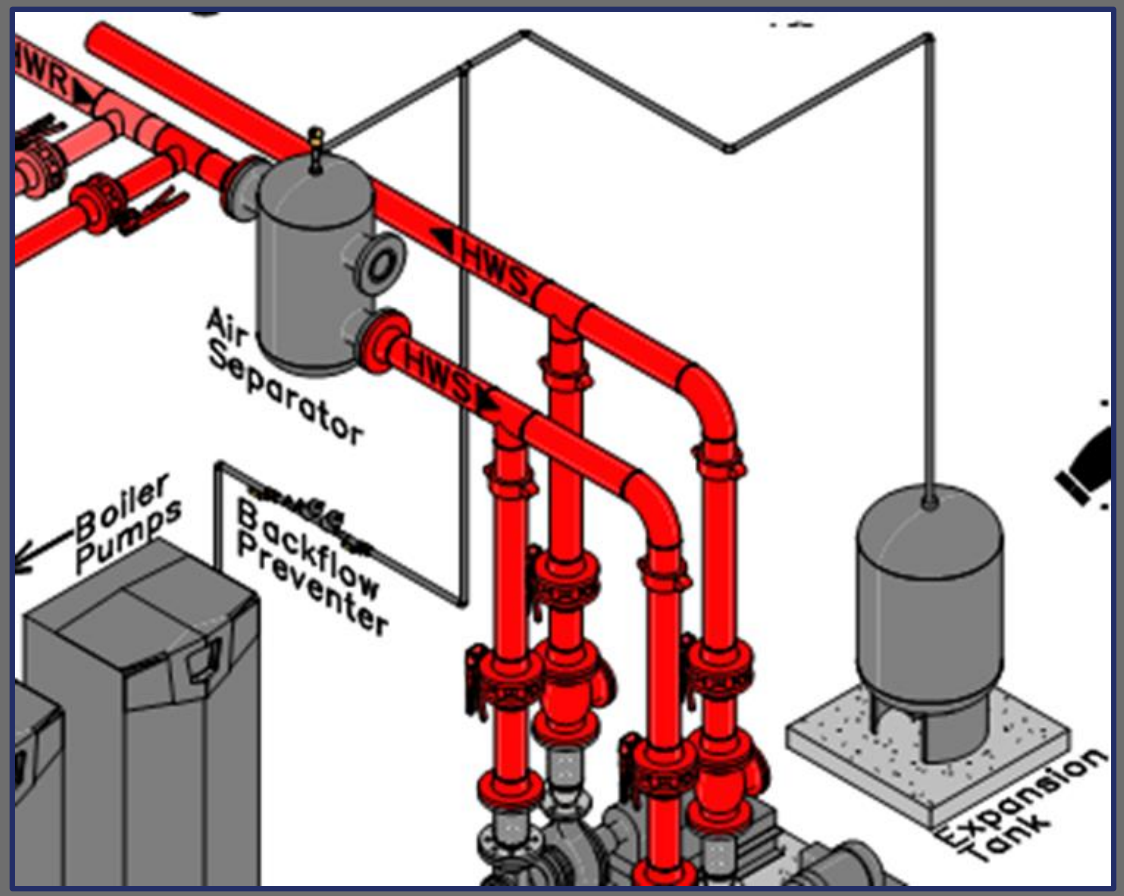
AIR SEPARATORS

HOW DO WE DEAL WITH EXPANSION OF WATER?

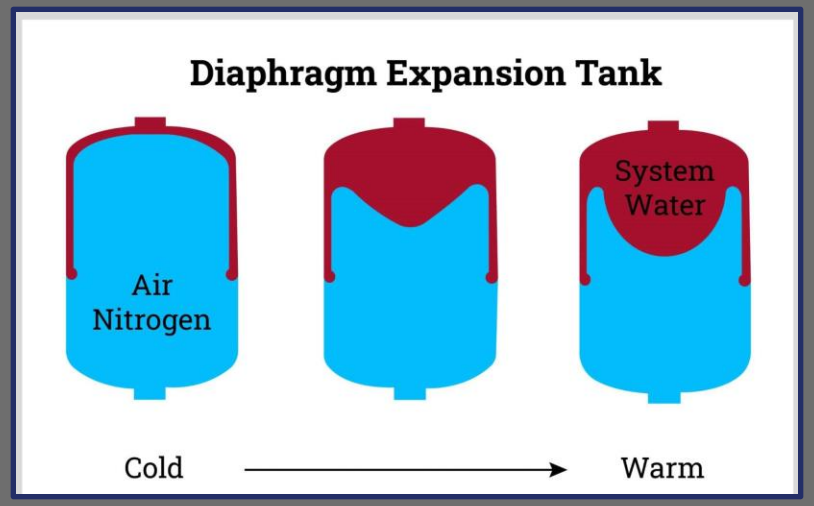
Expansion Tank

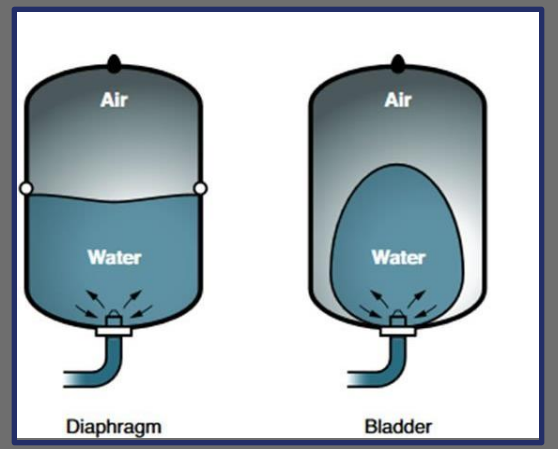


EXPANSION TANK



EXPANSION TANKS



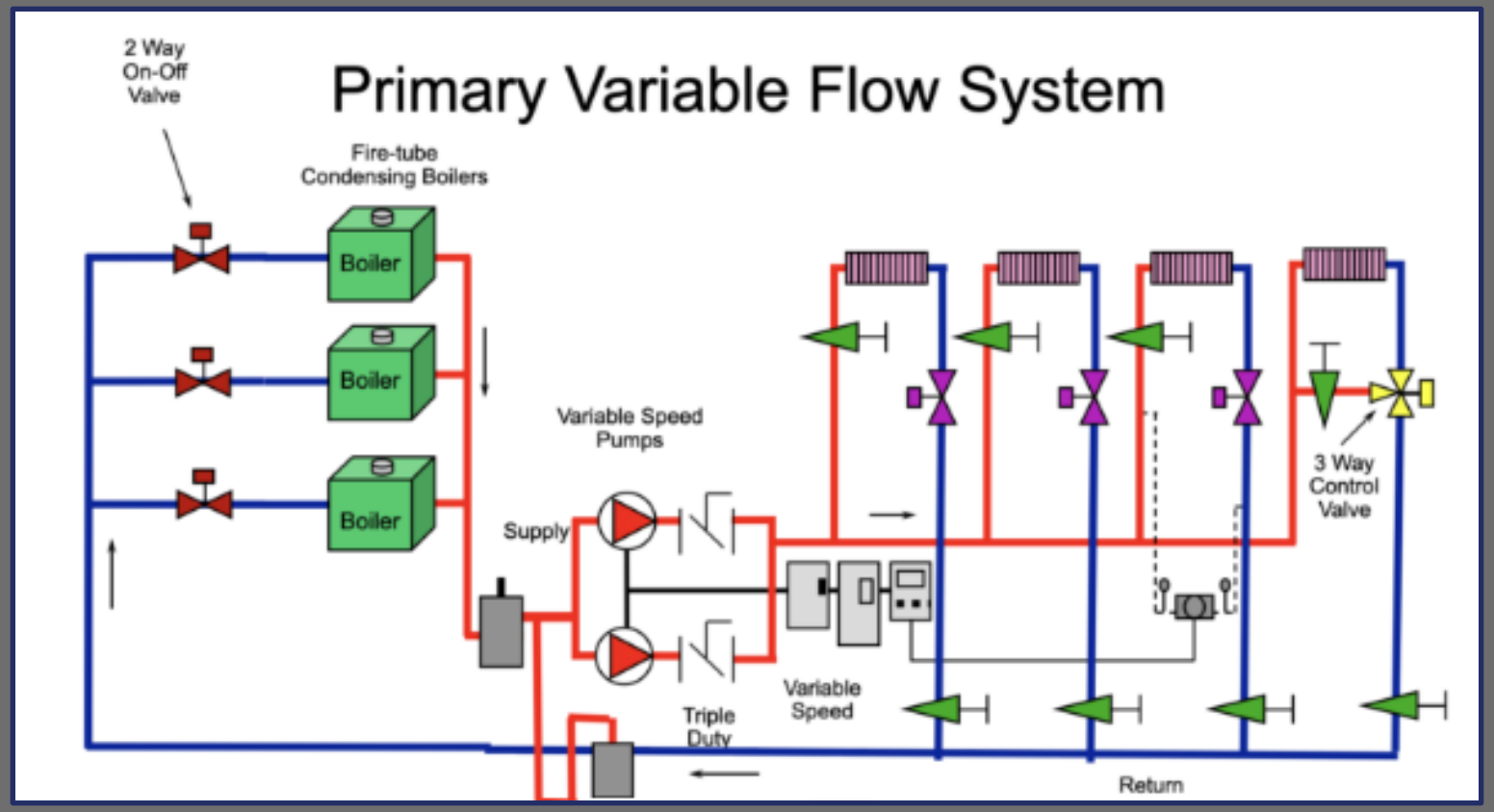


HOW ARE SYSTEMS PIPED?

Typically, Two Designs

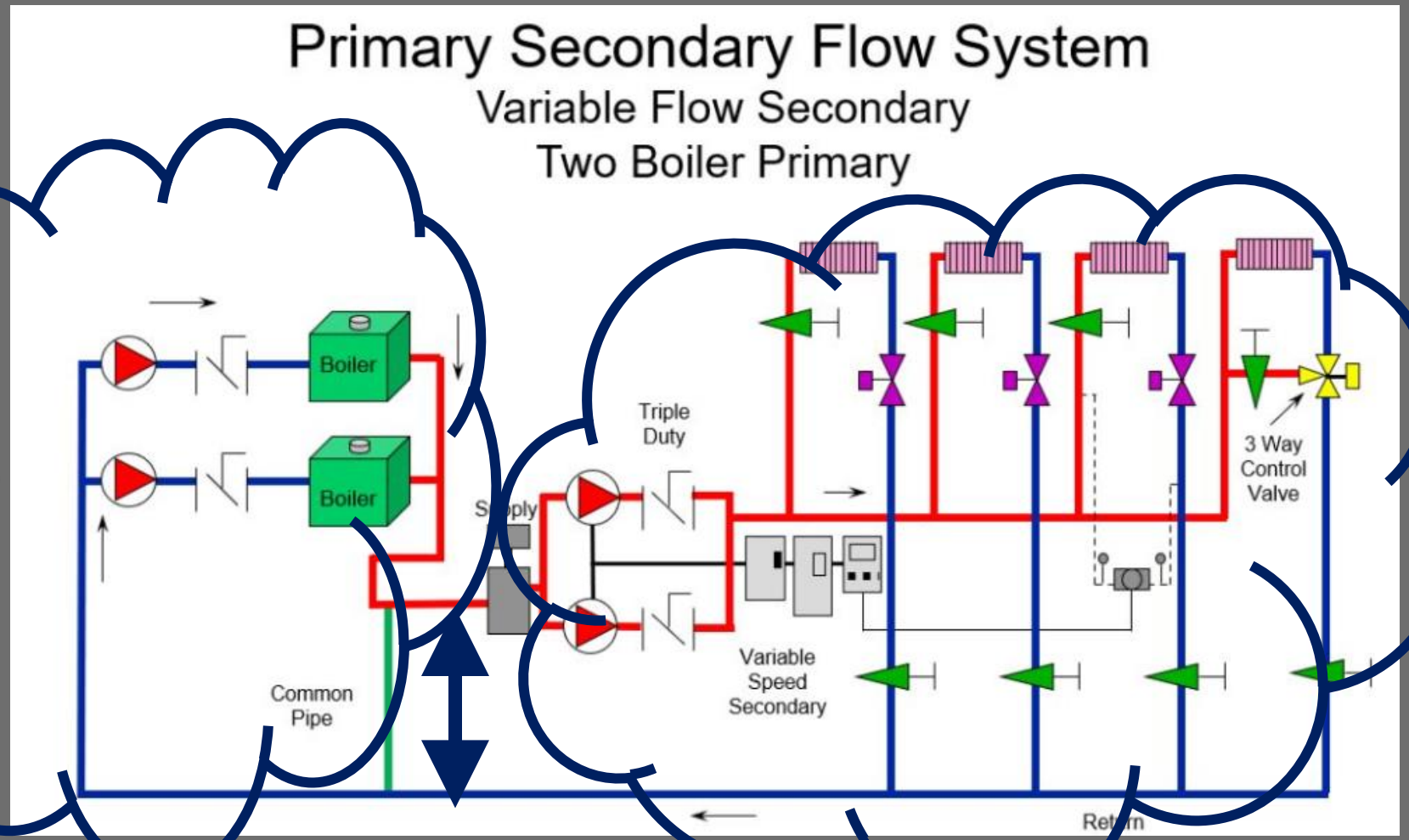
- Primary
- Primary-Secondary

PRIMARY PUMPING SYSTEMS



PRIMARY PUMPING SYSTEMS

PRIMARY-SECONDARY PUMPING SYSTEMS



Bypass
Decoupler
Common Pipe

Primary Loop

Secondary Loop

INSTALLED? WHAT NEXT?

System must be maintained

Boiler

- Blowdowns
- Tube Cleaning
- Regulatory Certifications
- Safety Points

Pumps

- Lubrication
- Coupler Check
- “Sounds”
- Amp Draws

Chemical Treatment

- Hardness Testing
- Sediment Check
- Fluid Levels
- Dosing Pump Checks

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