

Charting a Course to Energy Independence

Providence, RI
August 9-12, 2009





2009 GOVENERGY

What's New With Fan Coils ?



Presented by

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*International Environmental Corporation
Oklahoma City*

Member USGBC



What Is A Fan Coil Unit ?



Fan + Coil = Fan Coil
Room Air Conditioner



How Do They Work ?



- **Quiet**
- **Fractional Horsepower Fan Motor**
- **No Compressor**
- **Only Sound Is From Fan**
- **Part of a Larger System**
 - ☐ **Water Pipes**
 - ☐ **Chiller or Boiler**
 - ☐ **Pumps**
 - ☐ **Fan Coils**
 - ☐ **Thermostats**
- **Very Simple Operation**
- **Very Few Moving Parts**
- **Very Simple Maintenance**



Typical Fan Coil Units





Where Are Fan Coils Used ?



Hotels

Hotel Monaco
Washington DC

1839 US Tariff Building – General Post Office
Owner: US Department of Interior
Lease: Kimpton Hotel & Restaurant Group



Where Are
Fan Coils
Used ?

Condos





Where Are Fan Coils Used ?



Office
Buildings

World Bank



Where Are Fan Coils Used ?



**GSA
Projects**



Where Are Fan Coils Used ?



Government
Buildings

**White House
East Portico**



Where Are Fan Coils Used ?

**National
Monuments**



Where Are Fan Coils Used ?



**Amusement
Parks**

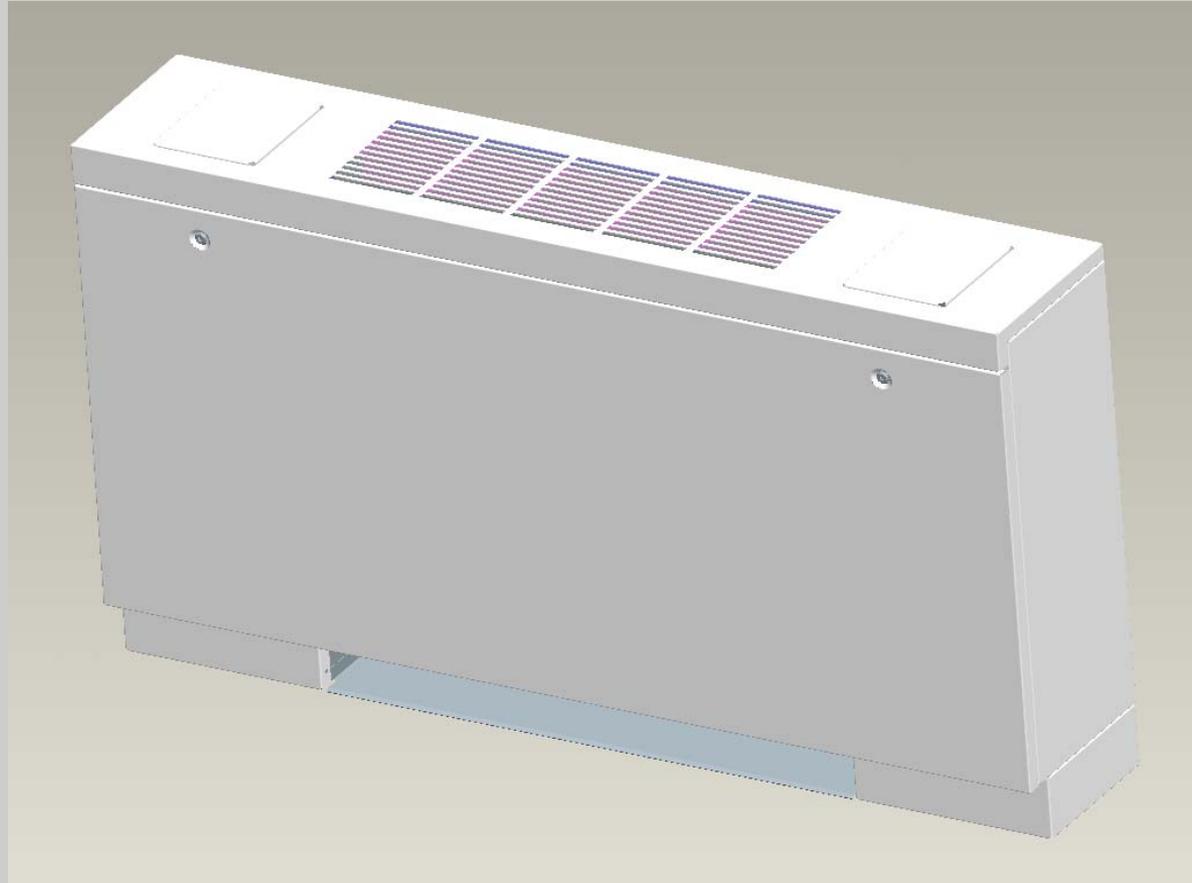
155,562 Hotel
Rooms

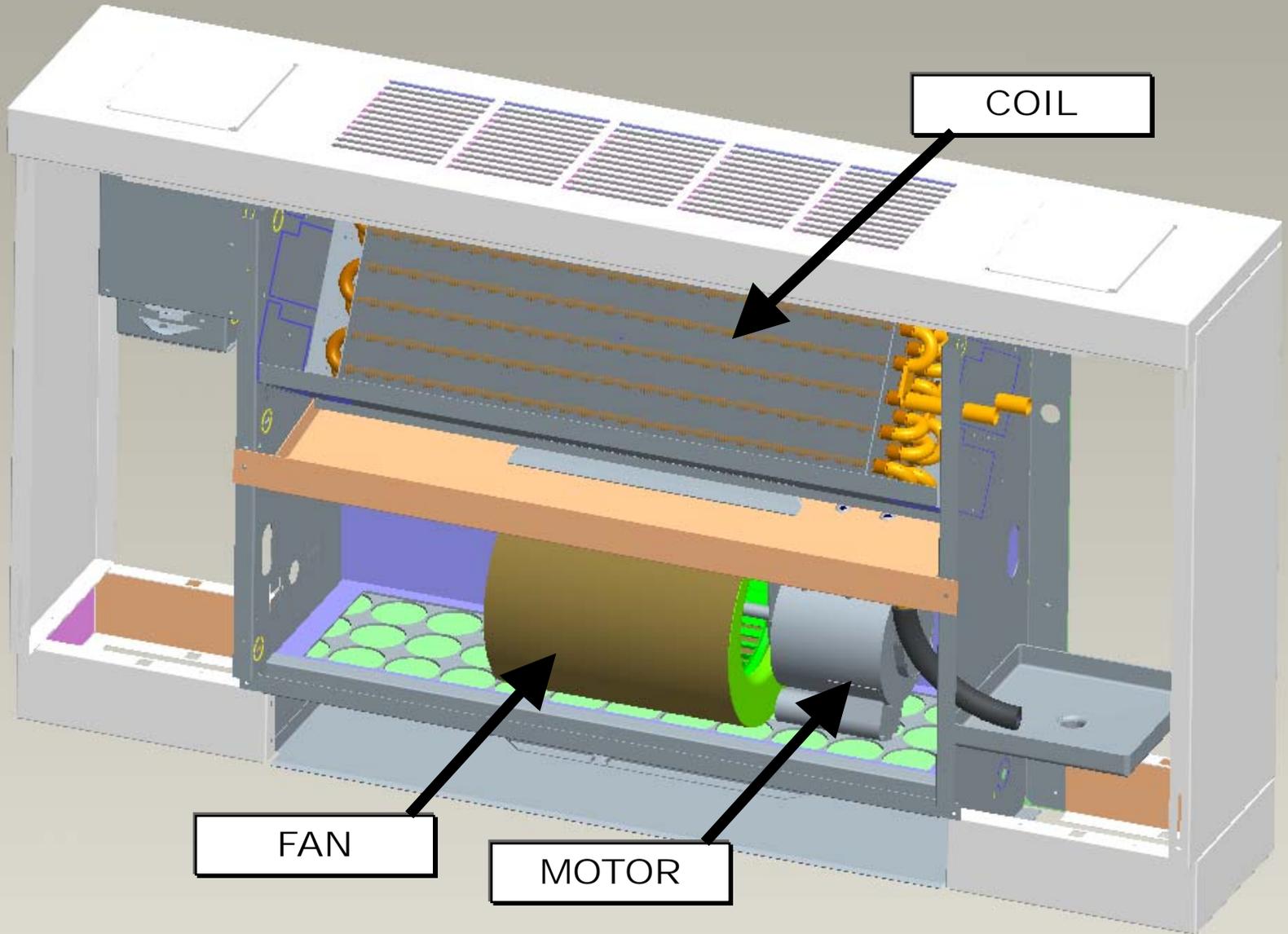
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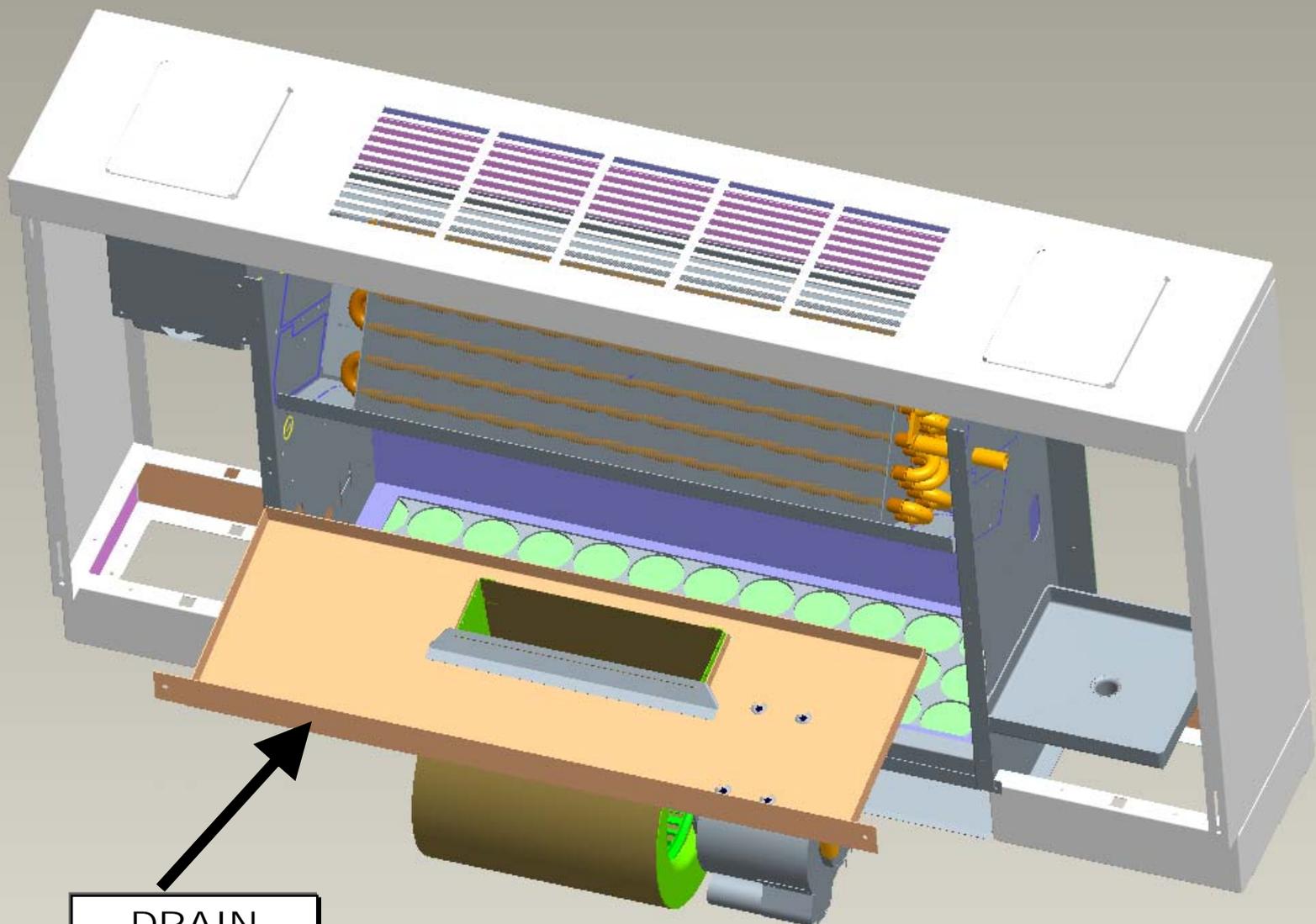
Large Majority  
Use Fan Coils



# What's Inside a Fan Coil ?



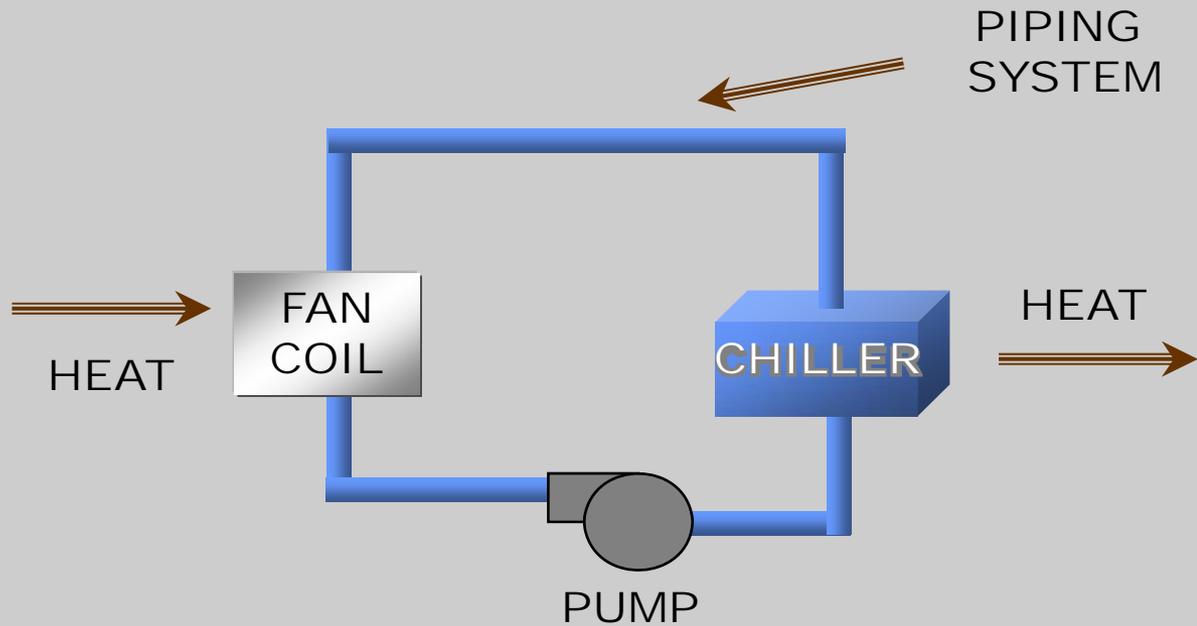




DRAIN  
PAN

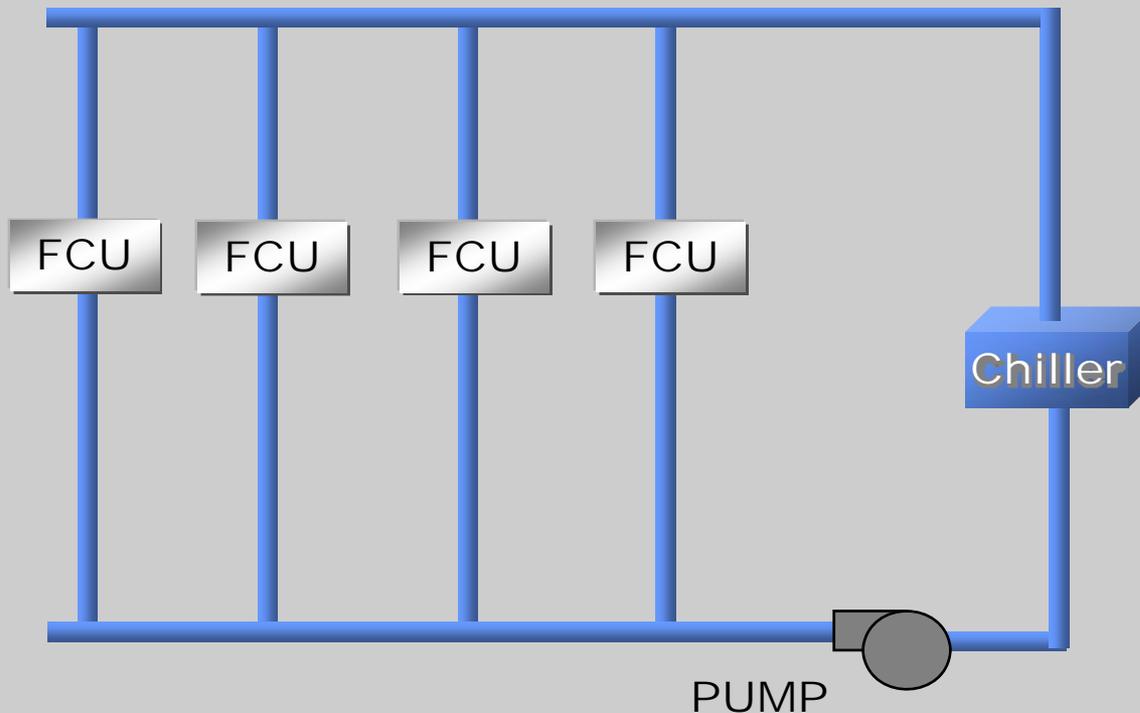


# How Do They Work ?





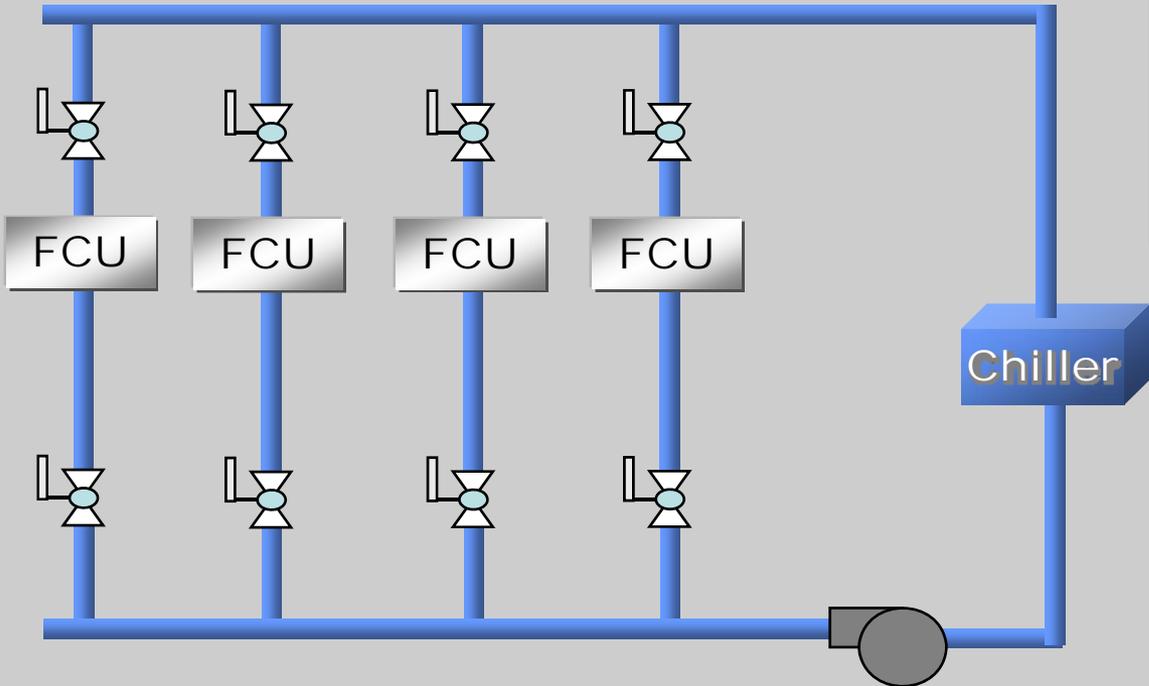
## Fan Coils Connected To Main Piping



Central Pump Pushes Water Through Piping  
to Supply Each Fan Coil

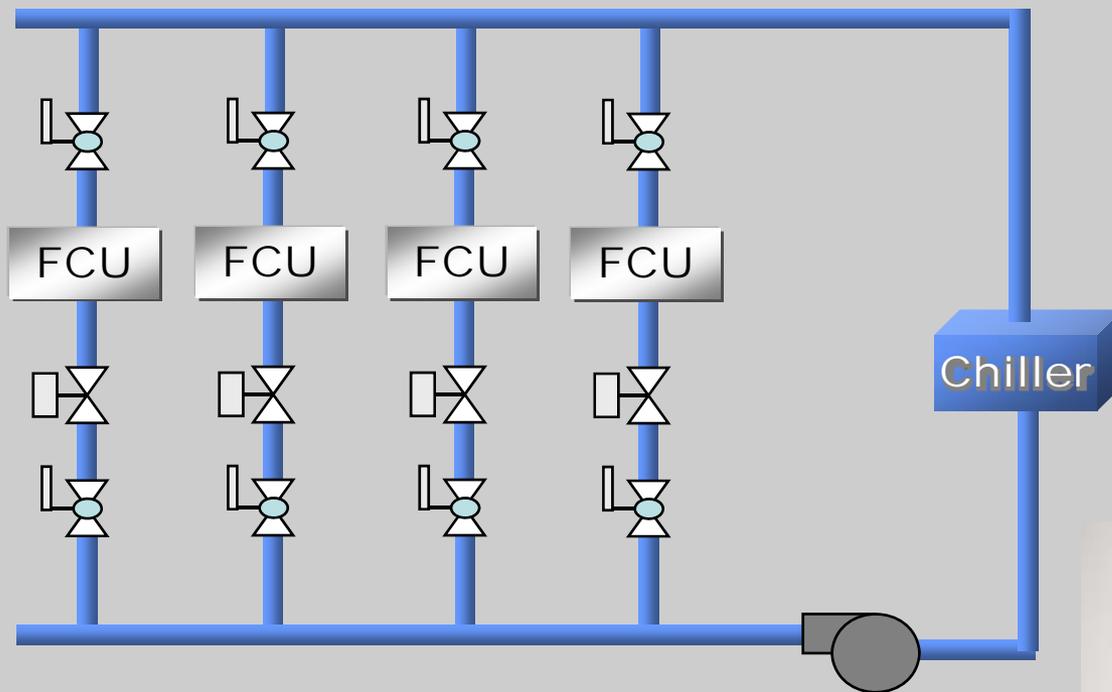


# Add Ball Valves For Service / Isolation



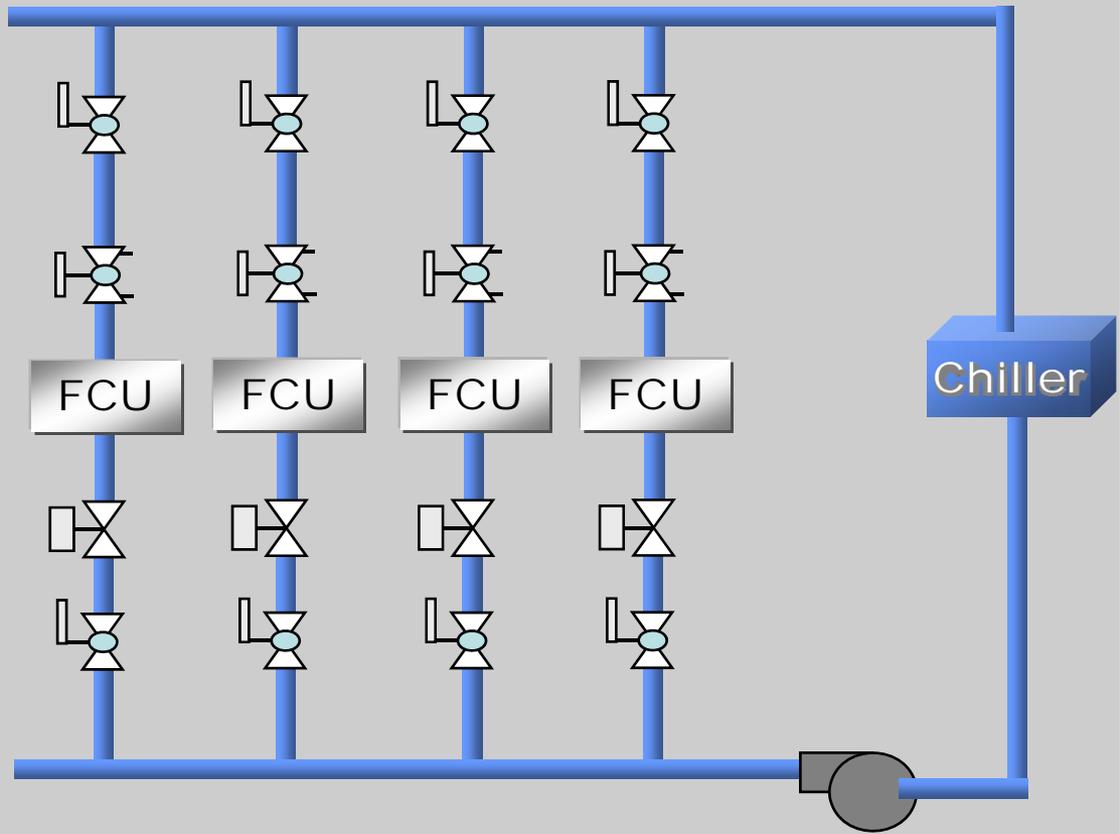


# Add Zone Valves And Thermostats For Individual Comfort Control



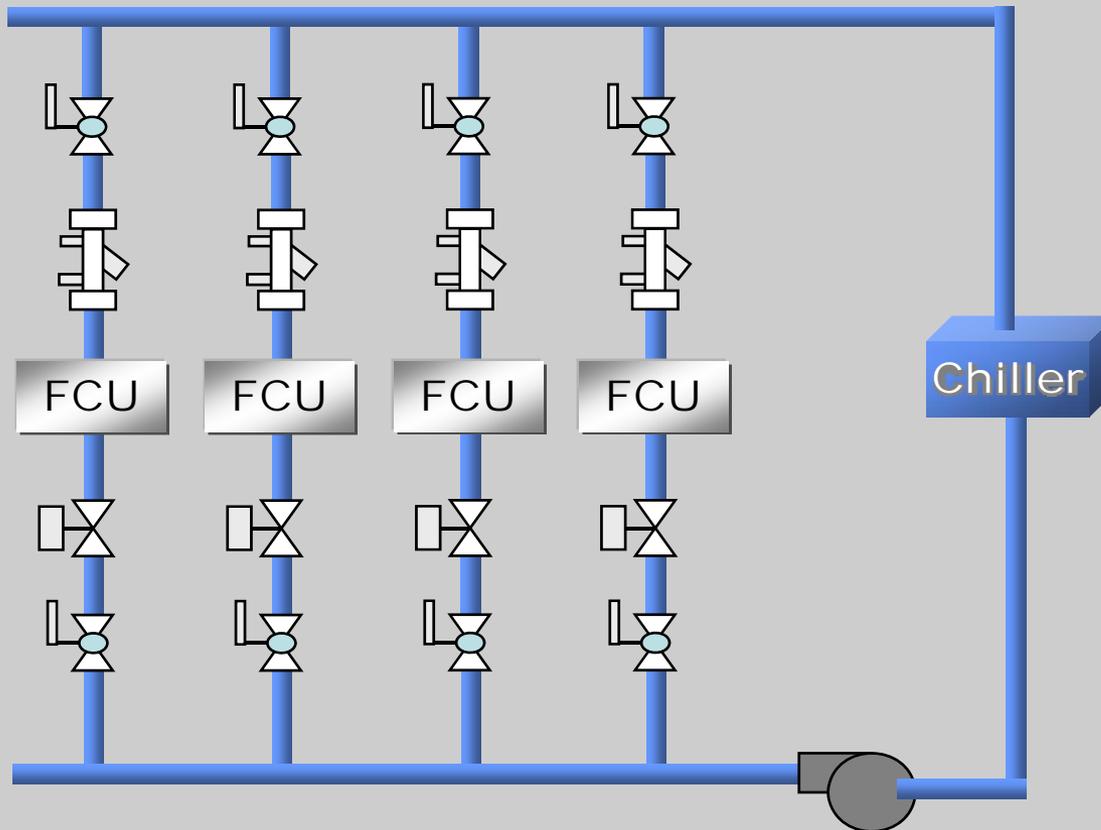


# Add Circuit Setters For Manual Balancing





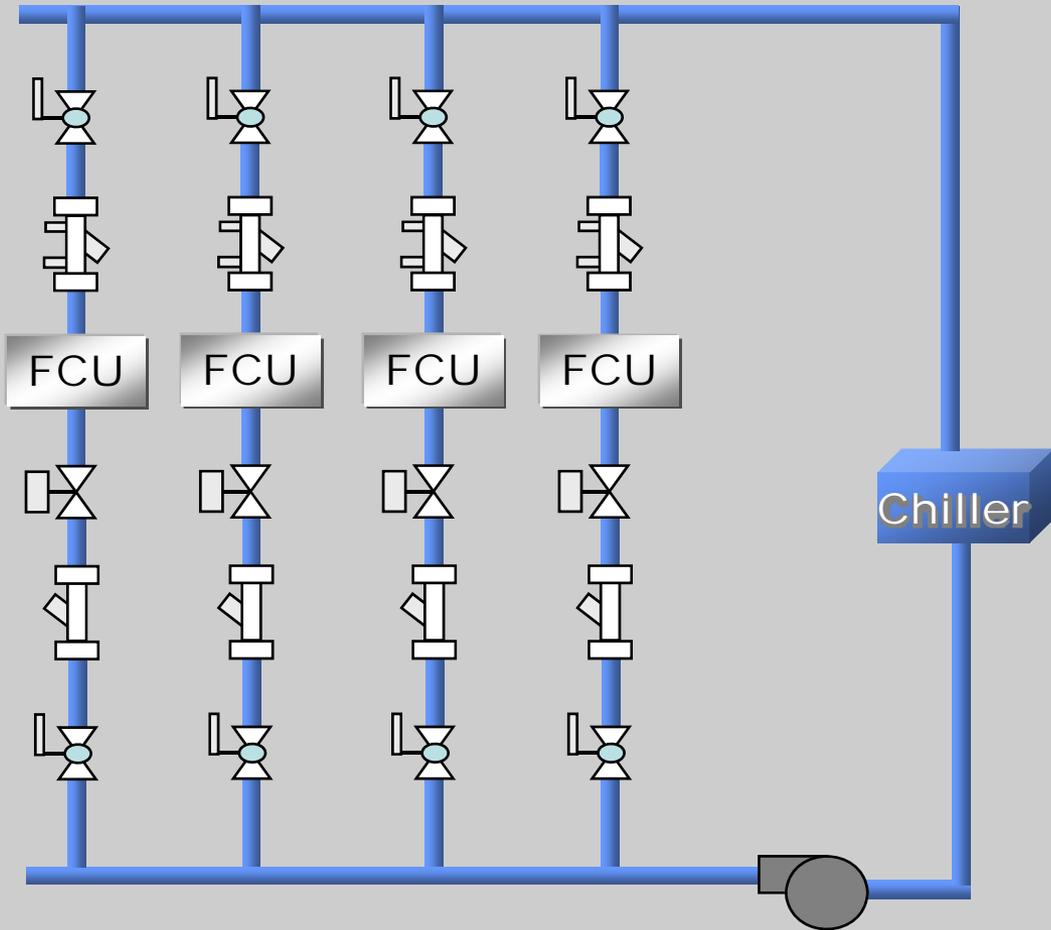
# Cartridge Valves For Automatic Balancing



Designed To Allow Only Specified Water Flow To Each Fan Coil Unit

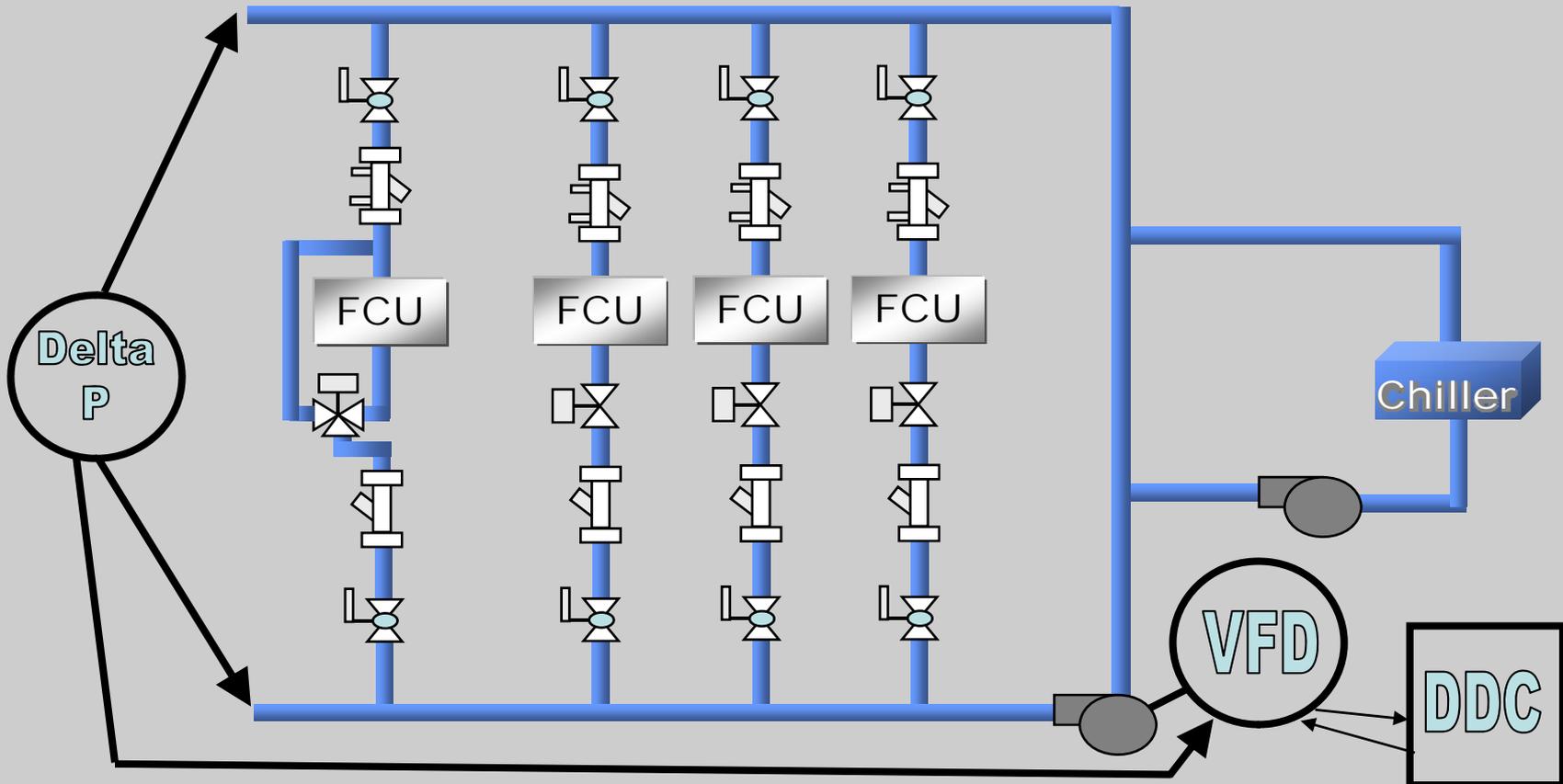


# Add Strainers To Protect Cartridge Valves





# Primary-Secondary Pumping System





## Valve Package Complexity – vs – Value ?





“Each piping system is a network;  
the more extensive the network,  
the more complex it is to understand,  
analyze, or control.

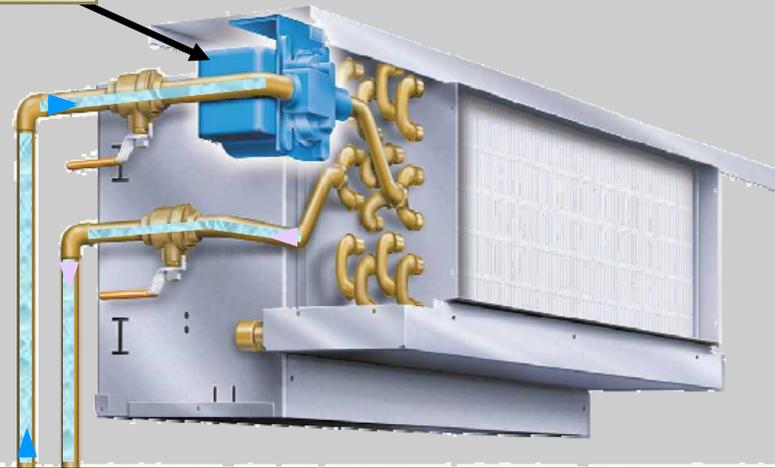
Thus, a major design objective is to maximize  
simplicity.”

2008 ASHRAE Handbook  
HVAC Systems and Equipment  
Chapter 12.



# SureFlow Fan Coil

Integrated Circulator  
Cycles on Thermostat Demand

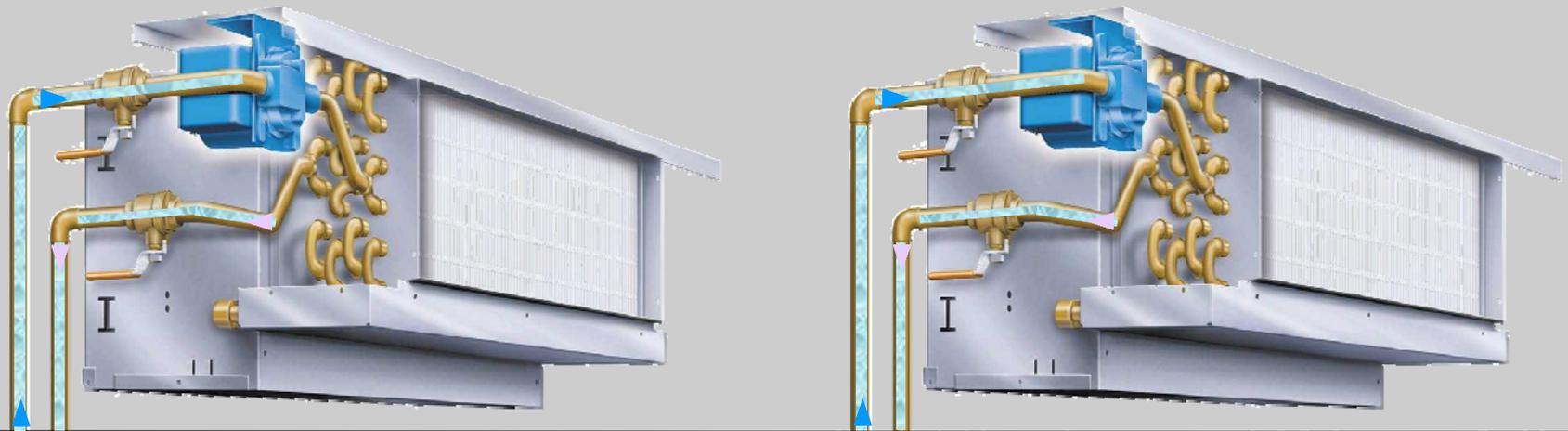


Primary Circuit Water  
Flow

2008 ASHRAE Handbook  
HVAC Systems and Equipment  
Chapter 12.



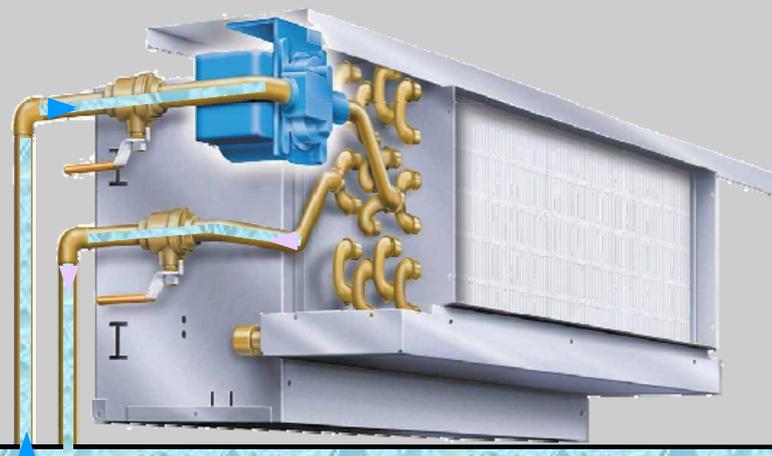
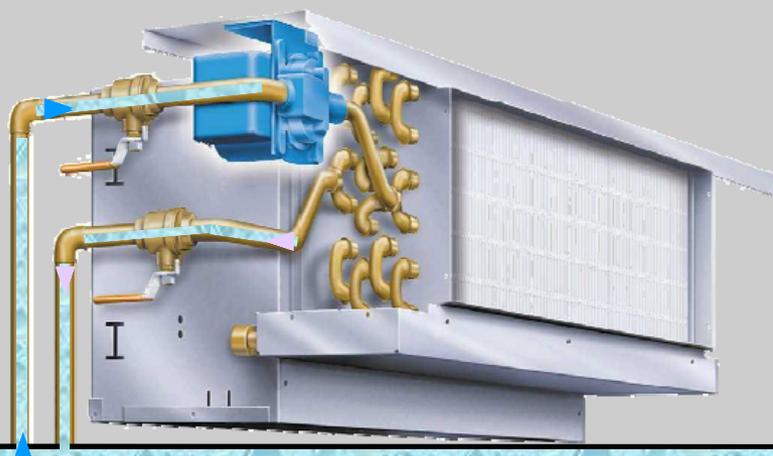
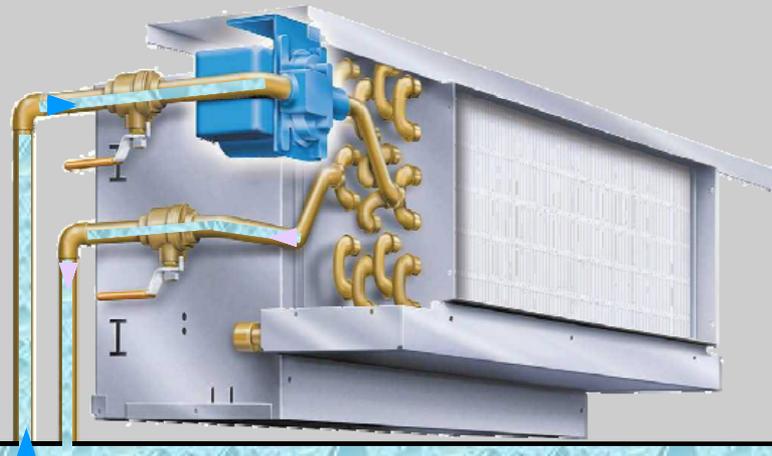
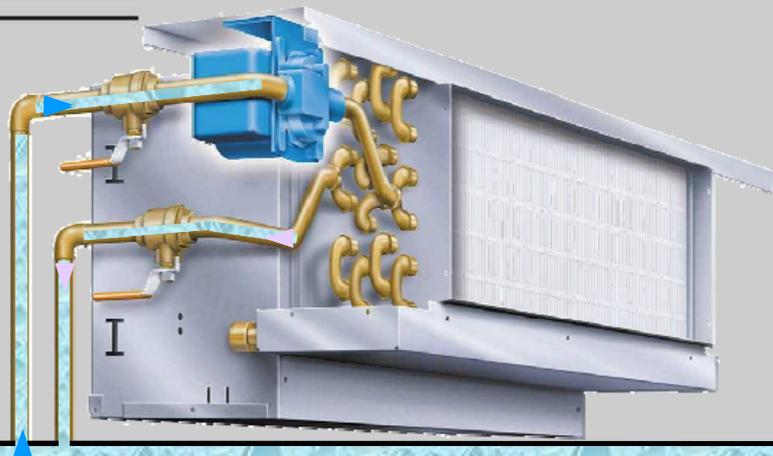
## Multiple SureFlow Units Share One Pipe



2008 ASHRAE Handbook  
HVAC Systems and Equipment  
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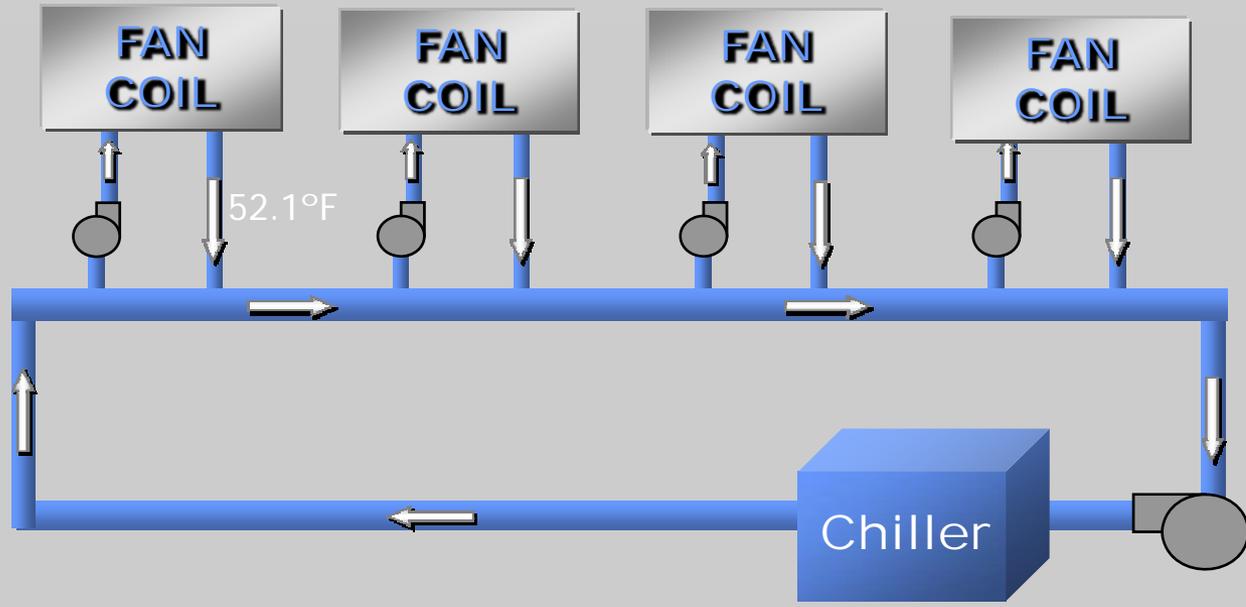


# Multiple Loops Connected In Parallel





# SureFlow System Pumping



Central Pump Is NOT Responsible For Pressure Drop Of Coils or Valves  
= Pump Energy Savings For Owner



## SureFlow = Simple Installation

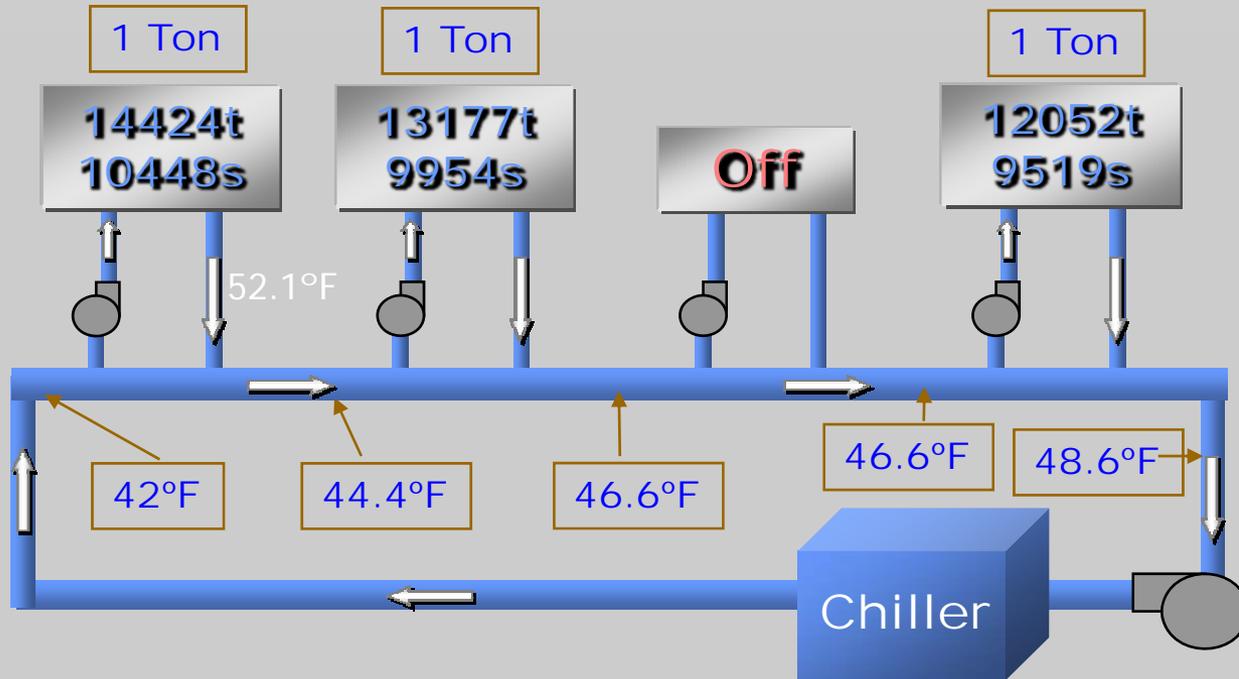
Average  
40% Less  
Piping



Reduced Piping = Contractor Savings



# SureFlow System Pumping



Water Circulation Rate = 3 GPM per Ton



## SureFlow Circulator – 1/40 HP



- *30+ Years In Production*
- *Millions In Use*
- *Quiet Operation*
- *Chilled Water CERTIFIED*
- *Wet Rotor Cartridge Design*
- *Internal Flow Check Valve*
- *200 PSI Rating*
- *Cycles On-Off (Thermostat Controlled)*
- *Low Energy Consumer – 65 Watts*



## SureFlow = Horsepower Savings

- **Central Pump Horsepower =  $\frac{\text{Head} \times \text{GPM}}{3960 \times \text{Efficiency}}$**
- **Reduced Head = Permanently Reduced Pump Horsepower**
- **If System Head Loss is reduced by 1/2 then Pump Horsepower is reduced by 1/2**
- **1 HP = \$566 / Year (Oklahoma)**
- **1 HP = \$1,928 / Year (Hawaii)**



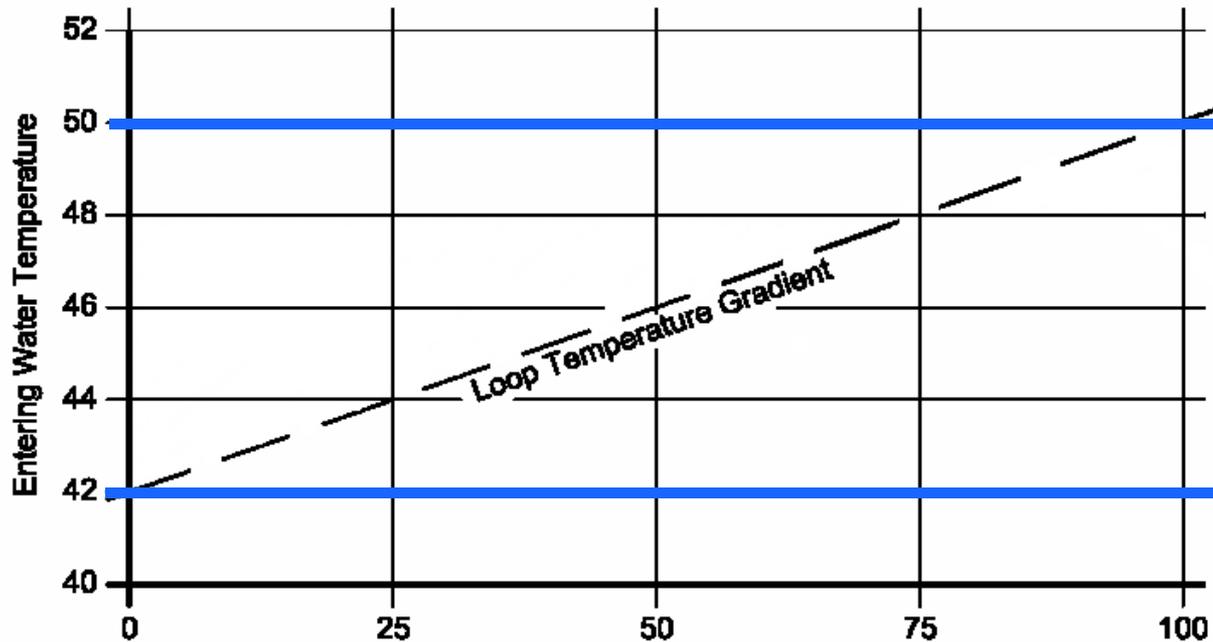
# SureFlow = System Energy Savings

- **Strategy: Demand Controlled Pumping**
- **Circulators Controlled by Local Room Thermostats**
- **Circulators Only Consume Power When Running**
- **Building Hydronic System Now Becomes A Natural Energy Management **System****

LEED-NC Credit EAc1  
Optimize Energy Performance  
Option 1: Whole Building Energy Simulation  
Up To 10 Points Available



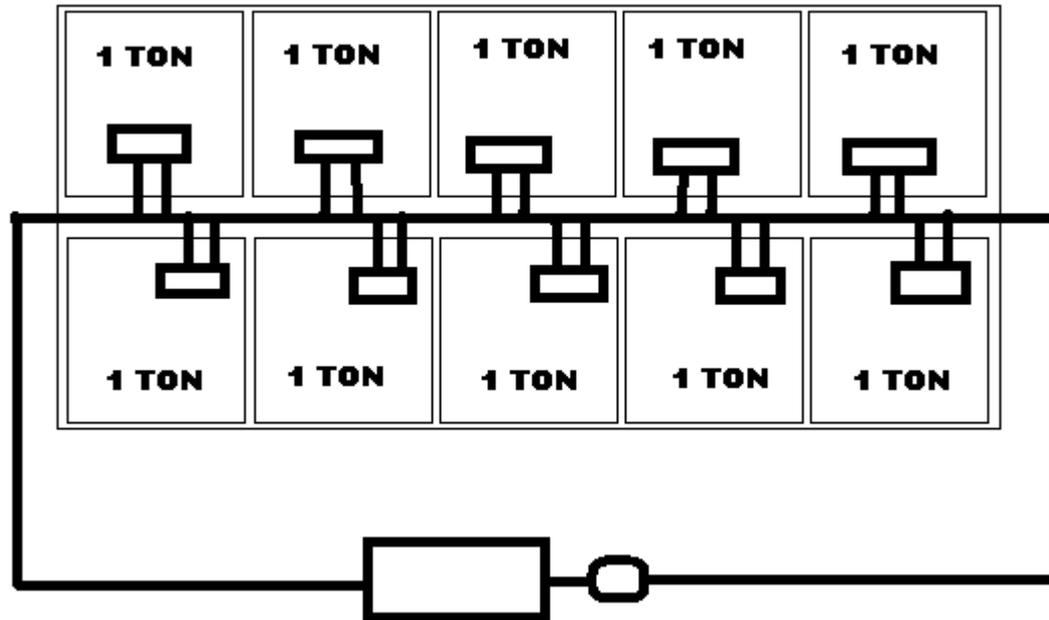
## SureFlow Cooling Loop Water Temperature



8 Degree Loop Delta-T = 3 GPM per Ton



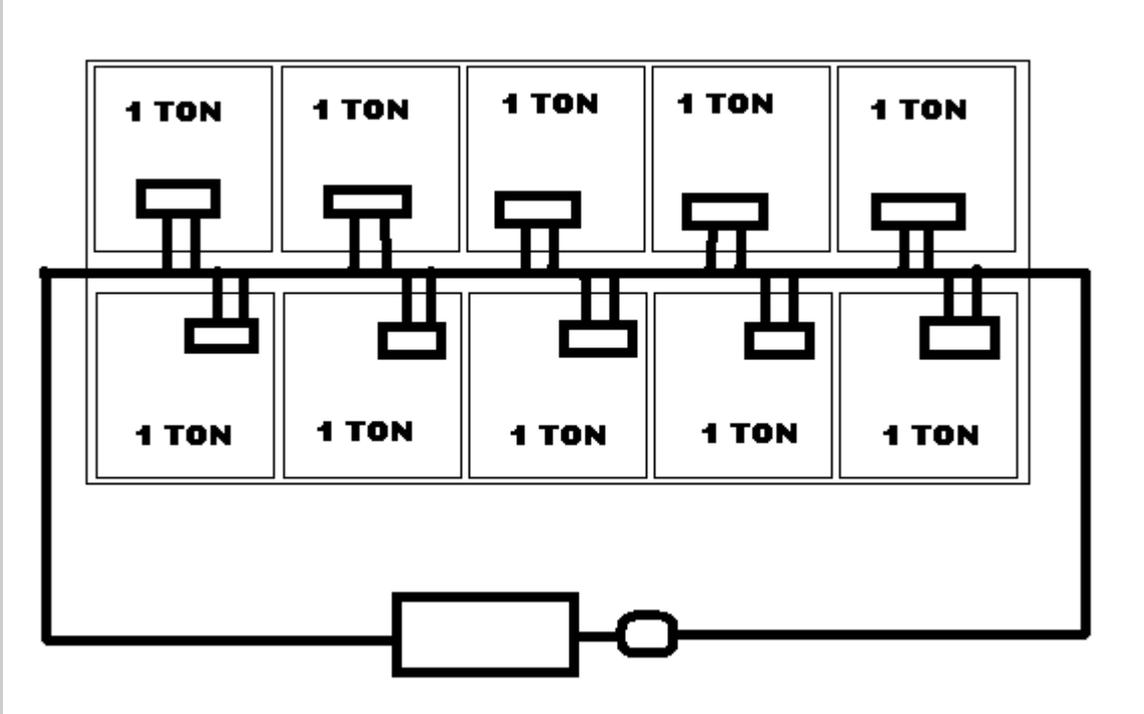
# SureFlow Peak Load Design



10 Tons Peak x 3 GPM per Ton = 30 GPM  
2" Copper Pipe @ 30GPM = 3.14 fps = 2.02 ftpd/100ft



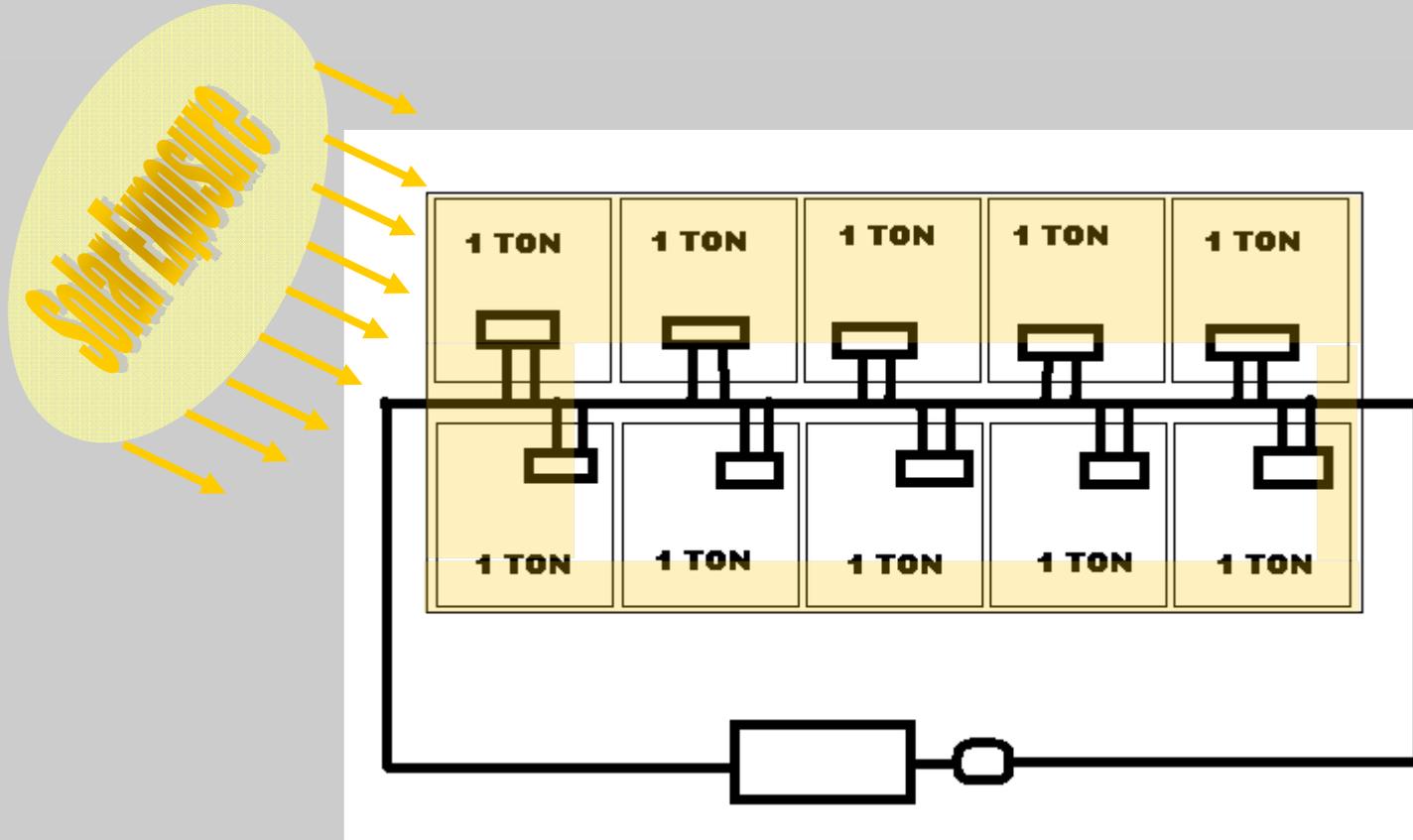
# Performance Design Review



Will This System Handle Peak Load ??



# Block vs Peak Load Analysis

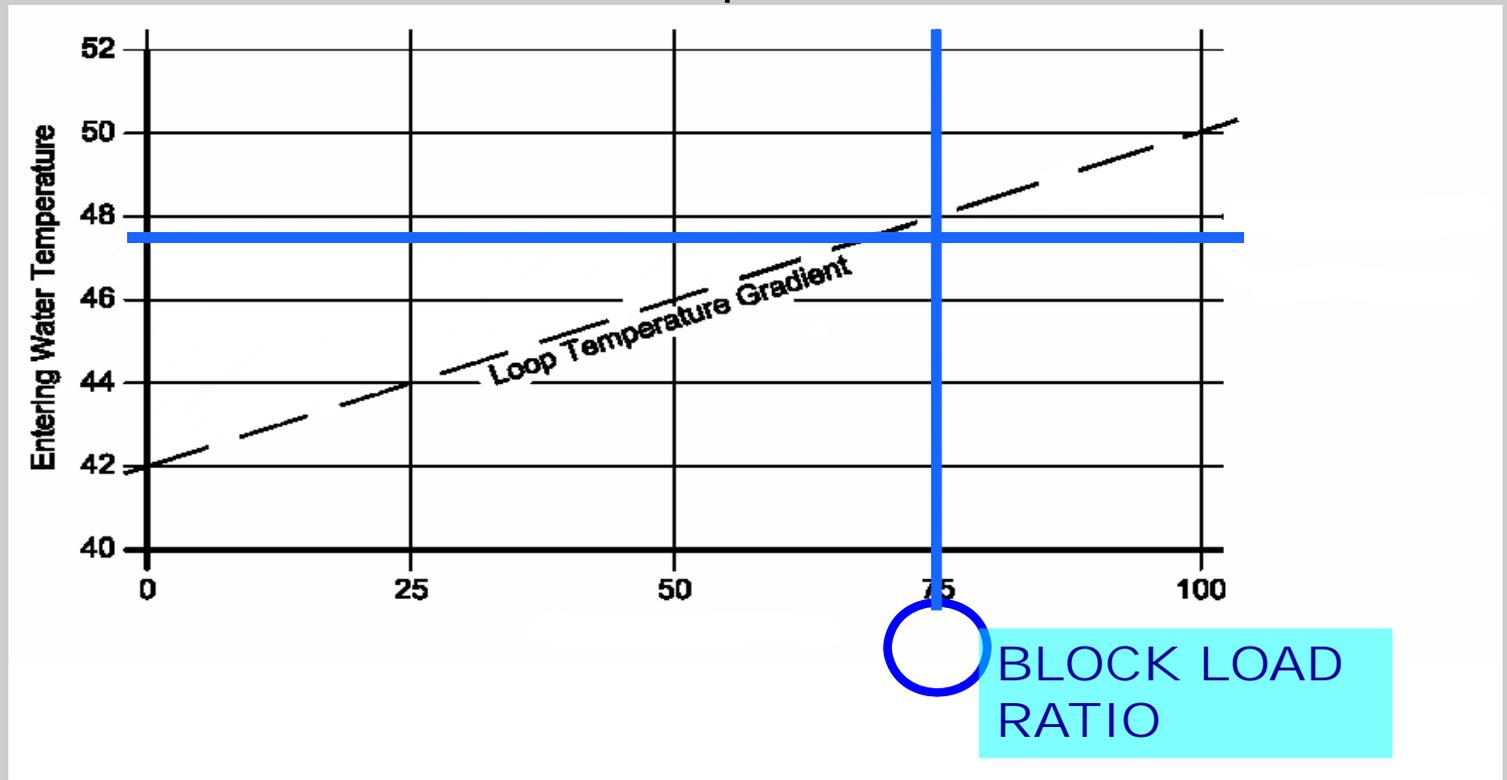


7.5 Tons Block / 10 Tons Peak  
= 75% Diversity Ratio



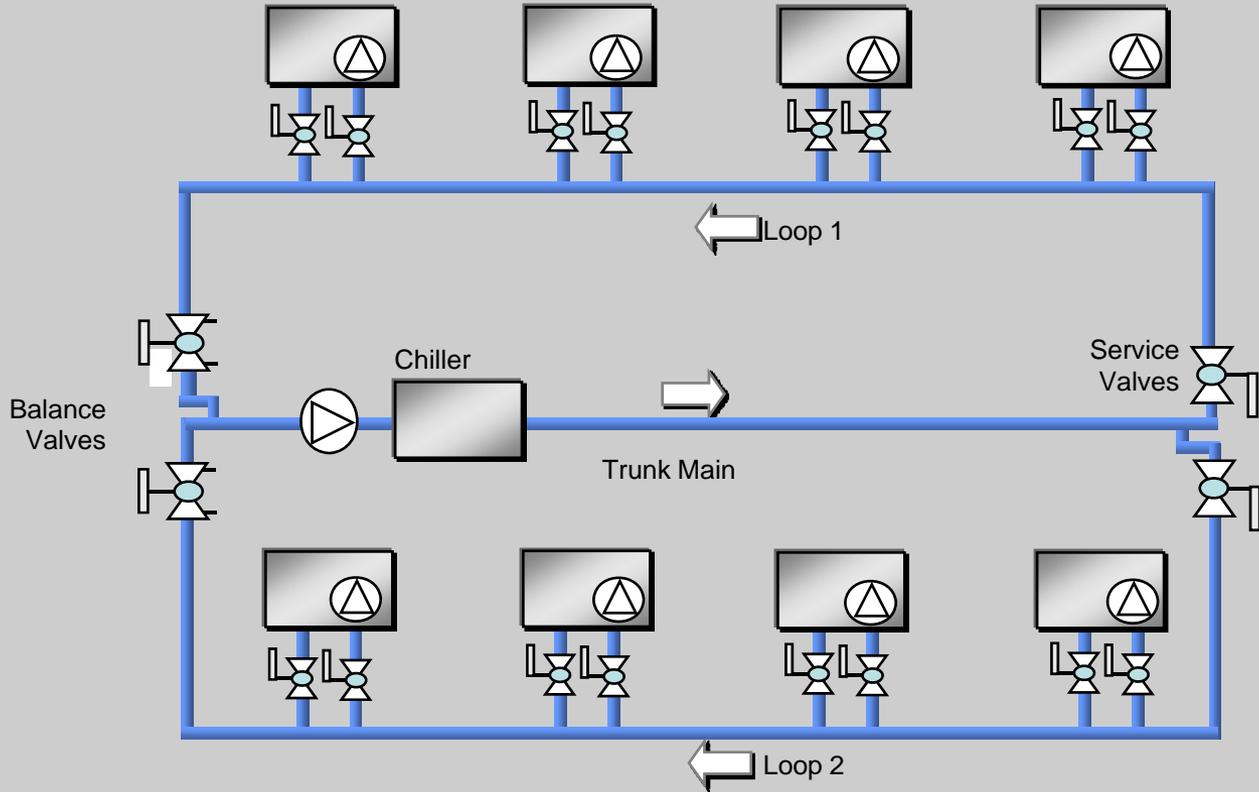
# SureFlow Design For Diversity

With 42F Supply, 3 GPM Per Ton, 75% Ratio  
Max Actual Water Temperature = 48F



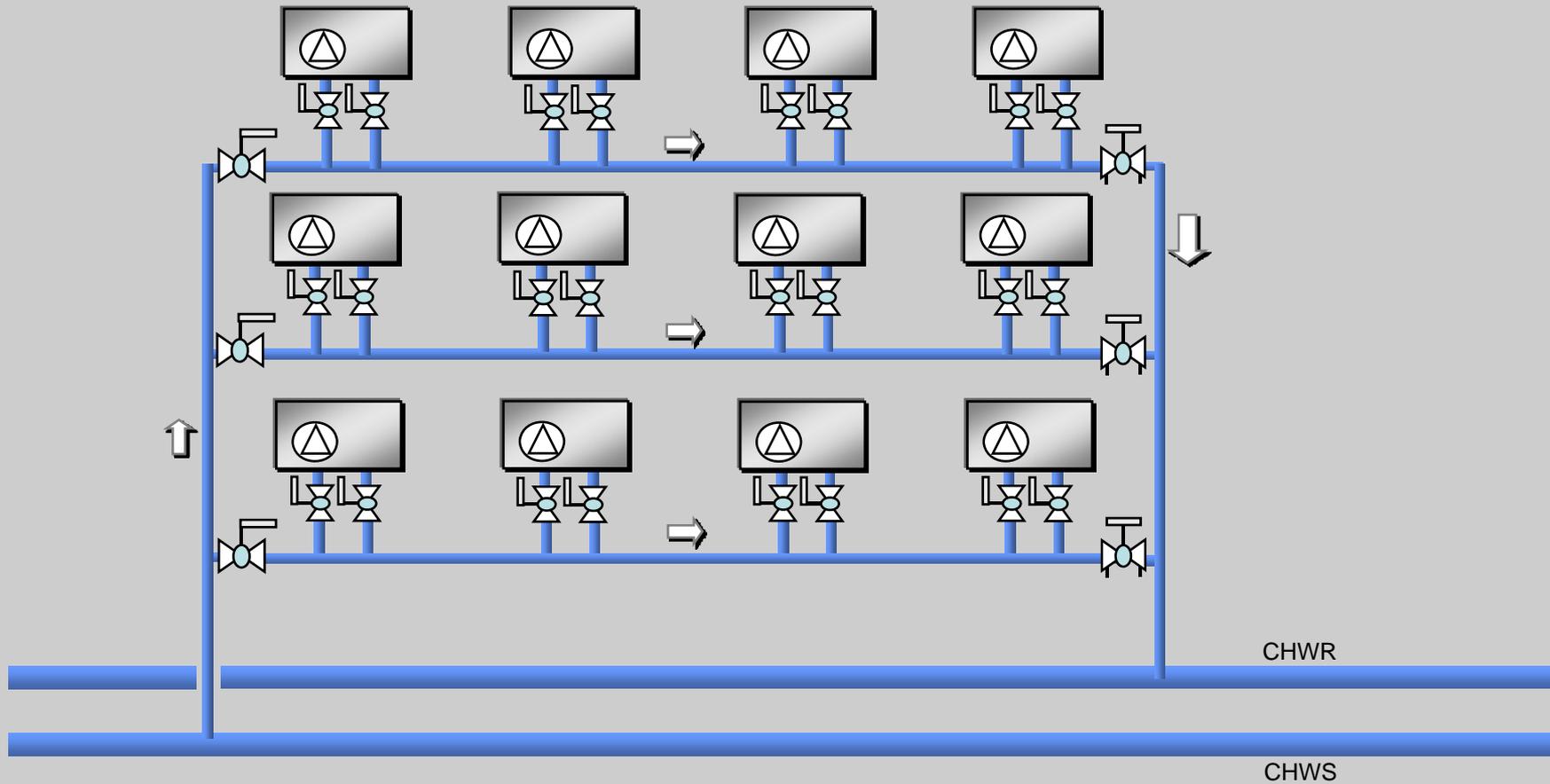


# Parallel SureFlow Loops



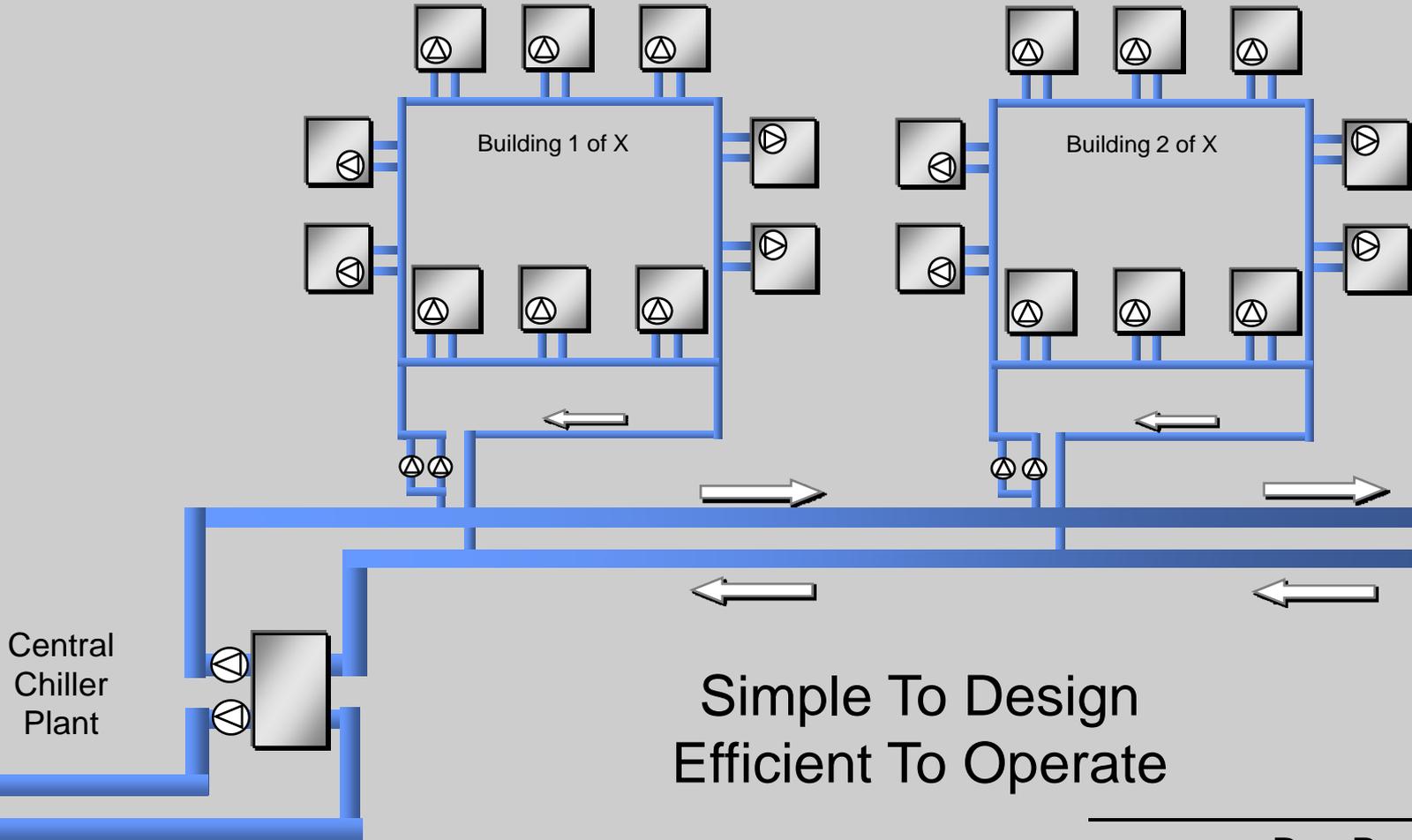


# Multiple Floors



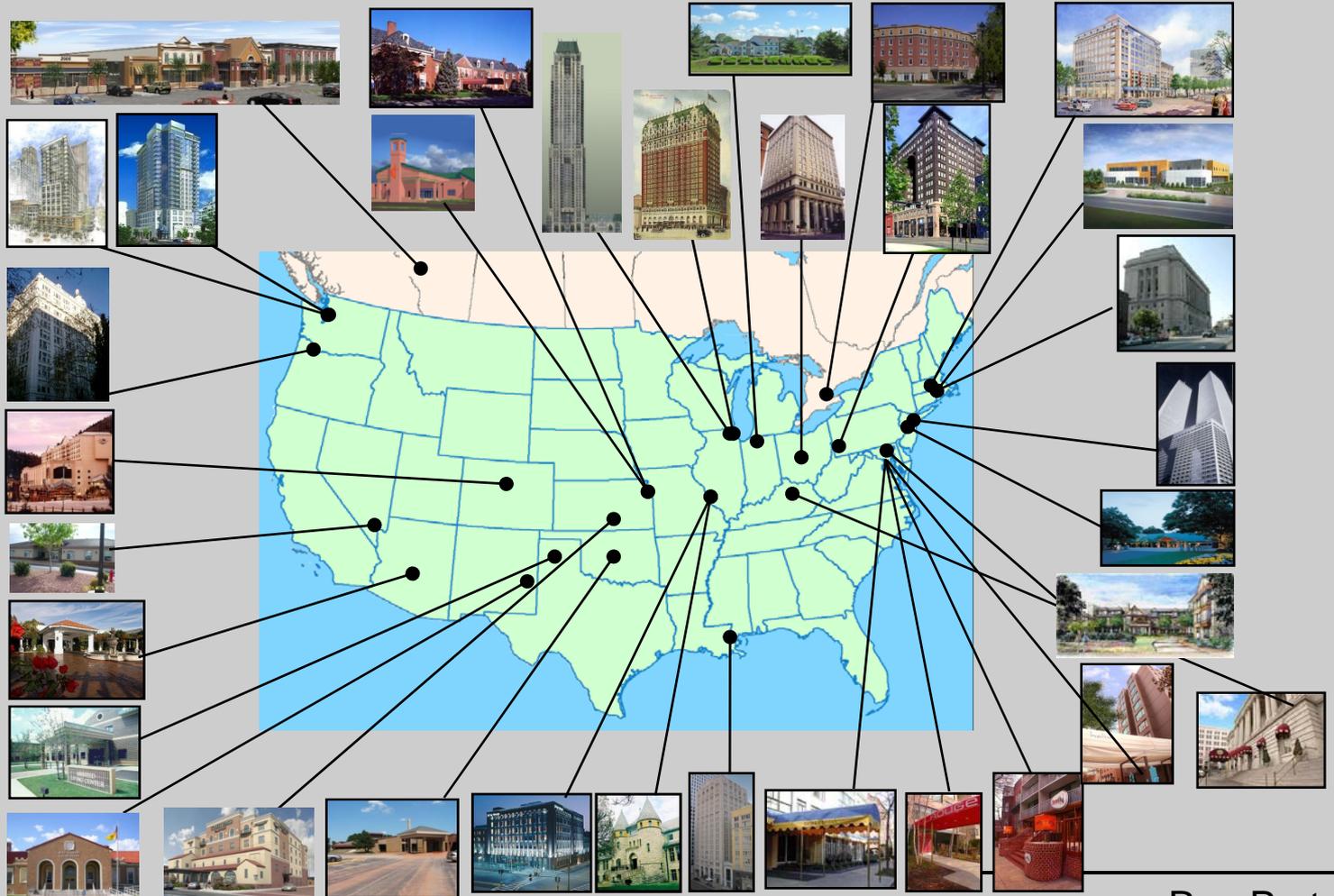


# SureFlow With District Chilled Water





# Where Are SureFlow Units Installed ?





# SureFlow Installation - Case Study

**Unfinished 1929 Masonic Temple**

**Providence, Rhode Island**

**Listed on National Register of Historic Places**





AIR JUN 2005



AIR JUL 2006





**RENAISSANCE**<sup>®</sup>  
HOTELS & RESORTS



tripadvisor.com  
Rated #1 of 11  
Hotels in  
Providence  
June 2009

# Marriott Renaissance Hotel 274 Rooms

Opened June 2007  
**SureFlow Installed**





# Why Use SureFlow Fan Coils ?

Average  
40% Less  
Piping

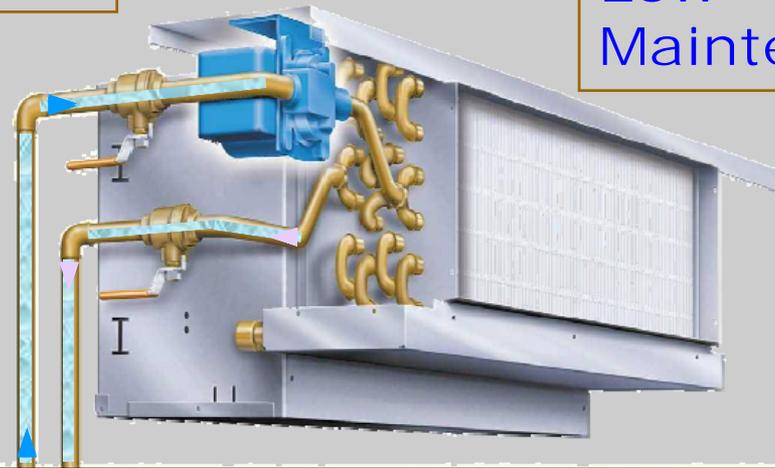
Occupant  
Comfort

Reliable  
Operation

Low  
Maintenance

Pump Energy  
Savings For  
Owner \$\$\$

Easy To  
Design



Installed Cost  
Savings \$\$\$

4 - Pipe  
Performance With  
2 Installed Pipes

LEED Credit  
Opportunities



For More Information  
[www.fancoil.com](http://www.fancoil.com)

