Security, Automation and Technology that works

HVAC SYSTEMS DESIGN

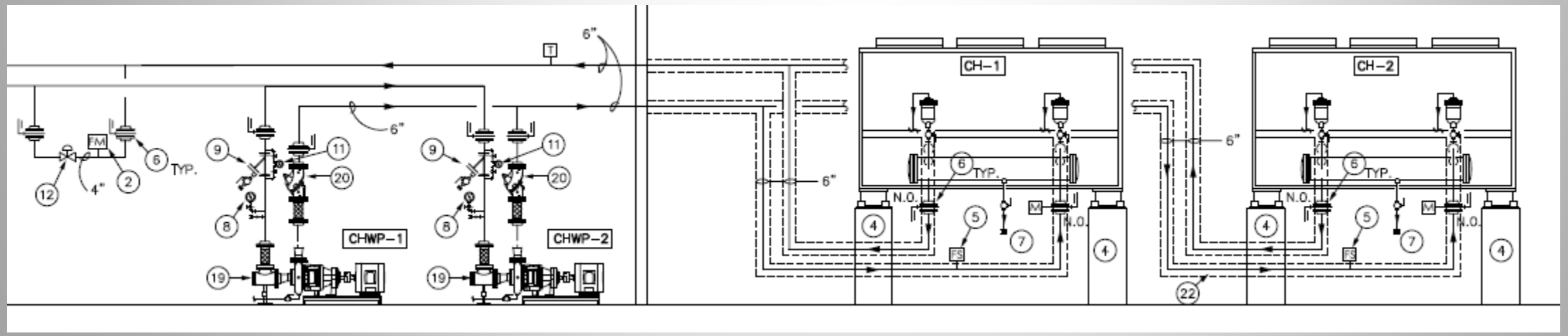
- HVAC systems get more complicated as efficiency is increased.
- HVAC systems typically won't support the entire building with all systems at full load.
- It is possible to exceed capacity of system.
- HVAC systems typically operate at part load conditions.
- Need to challenge engineers to consider partial load operations and after hours operations when selecting equipment.
- Require engineers to allow multiple manufacturers.

Meaning of acronyms:
DB: Dry bulb temperature, °F *WB: Wet bulb temperature, °F*
MCWB: Mean coincident wet bulb temperature, °F
Lat: Latitude, °
DP: Dew point temperature, °F
MCDB: Mean coincident dry bulb temperature, °F
Long: Longitude, °
HR: Humidity ratio, grains of moisture per lb of dry air
Elev: Elevation, ft
WS: Wind speed, mph
HDD and CDD 65: Annual heating and cooling degree-days, base 65°F, °F-day

Station	Lat	Long	Elev	Heating DB		Cooling DB/MCWB						Evaporation WB/MCDB				Dehumidification DP/HR/MCDB						Extreme Annual WS			Heat./Cool. Degree-Days	
						0.4%		1%		2%		0.4%		1%		0.4%			1%							
				99.6%	99%	DB / MCWB		DB / MCWB		DB / MCWB		WB / MCDB		WB / MCDB		DP / HR / MCDB			DP / HR / MCDB			1%	2.5%	5%	HDD / CDD 65	
Texas																								*51 sites, 34 more on CD-RON*		
HOUSTON/INTERCONTIN	29.99N	95.36W	105	30.3	33.8	97.2	76.6	95.2	76.7	93.4	76.6	80.2	88.9	79.4	88.2	78.2	147.1	82.9	77.3	142.7	82.5	19.6	17.8	16.2	1371	3059

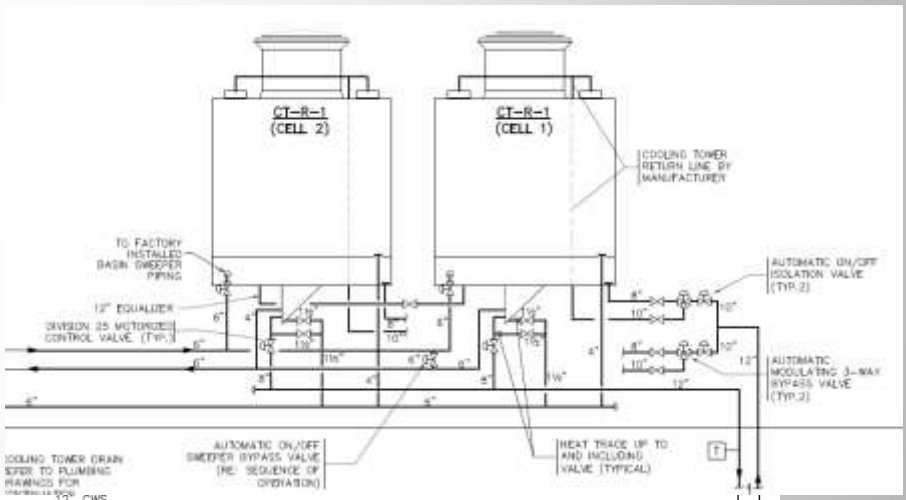
AIR COOLED CHILLERS

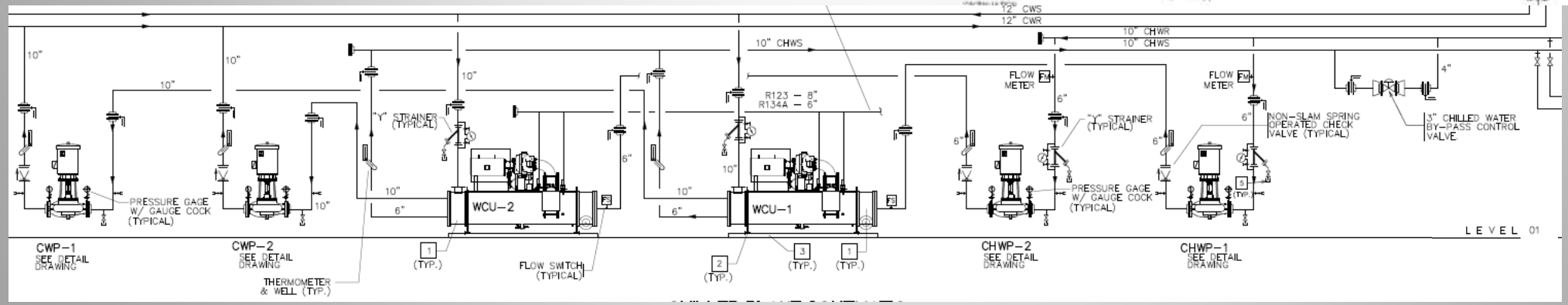
- Less efficient at full load.
- Partial load efficiency is more in line with centrifugal water cooled chillers.
- Minimal water consumption.



WATER COOLED CHILLERS

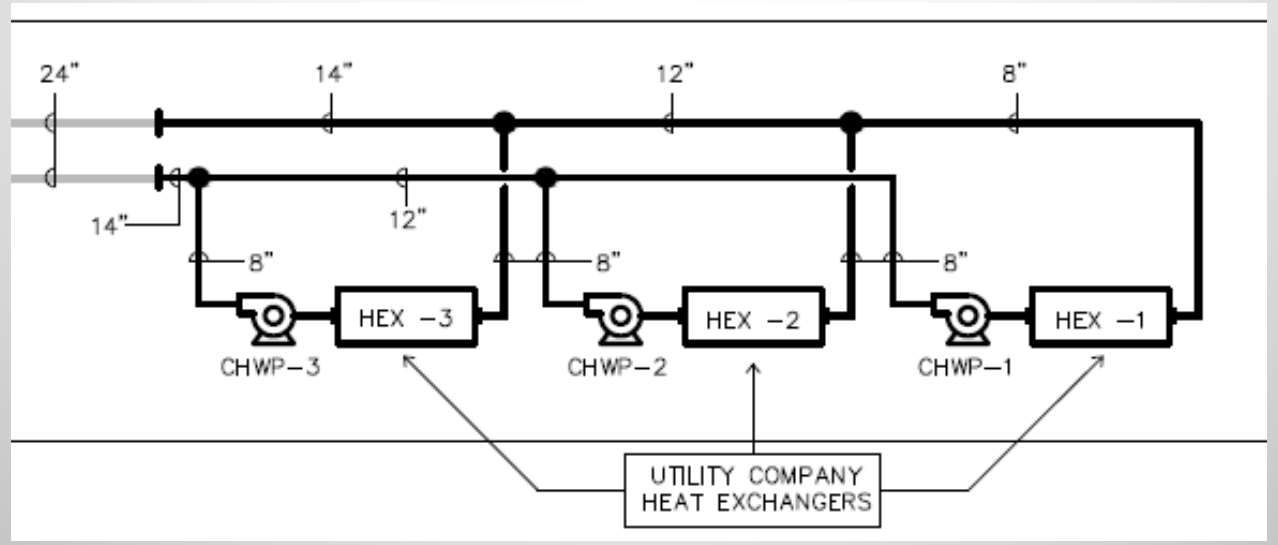
- More efficient at full load.
- Use water significant amounts of water.
- Require more building space.





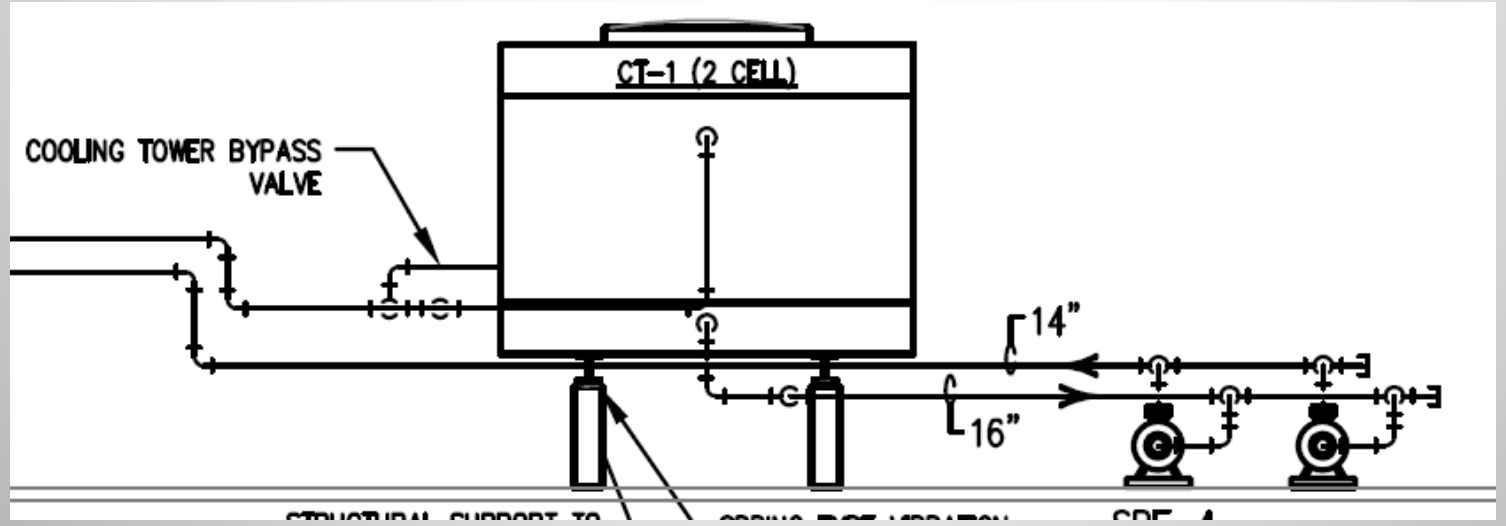
DISTRICT CHILLED WATER

- Uses chilled water provided to the building by a district cooling plant.
- Lower upfront cost for equipment.
- Typically more expensive long term.

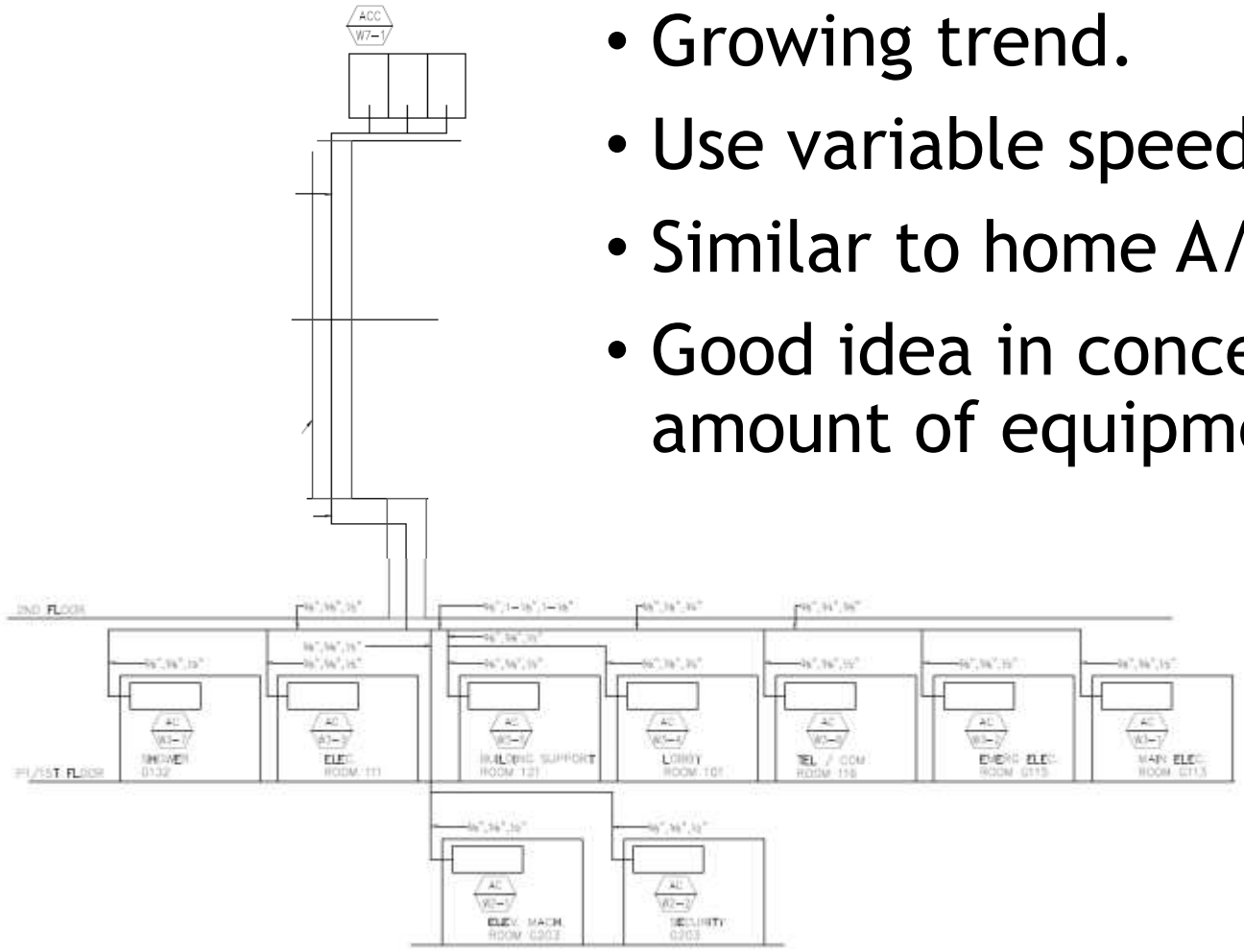


WATER COOLED SELF CONTAINED UNITS

- Typically less efficient than chilled water.
- Use water significant amounts of water.

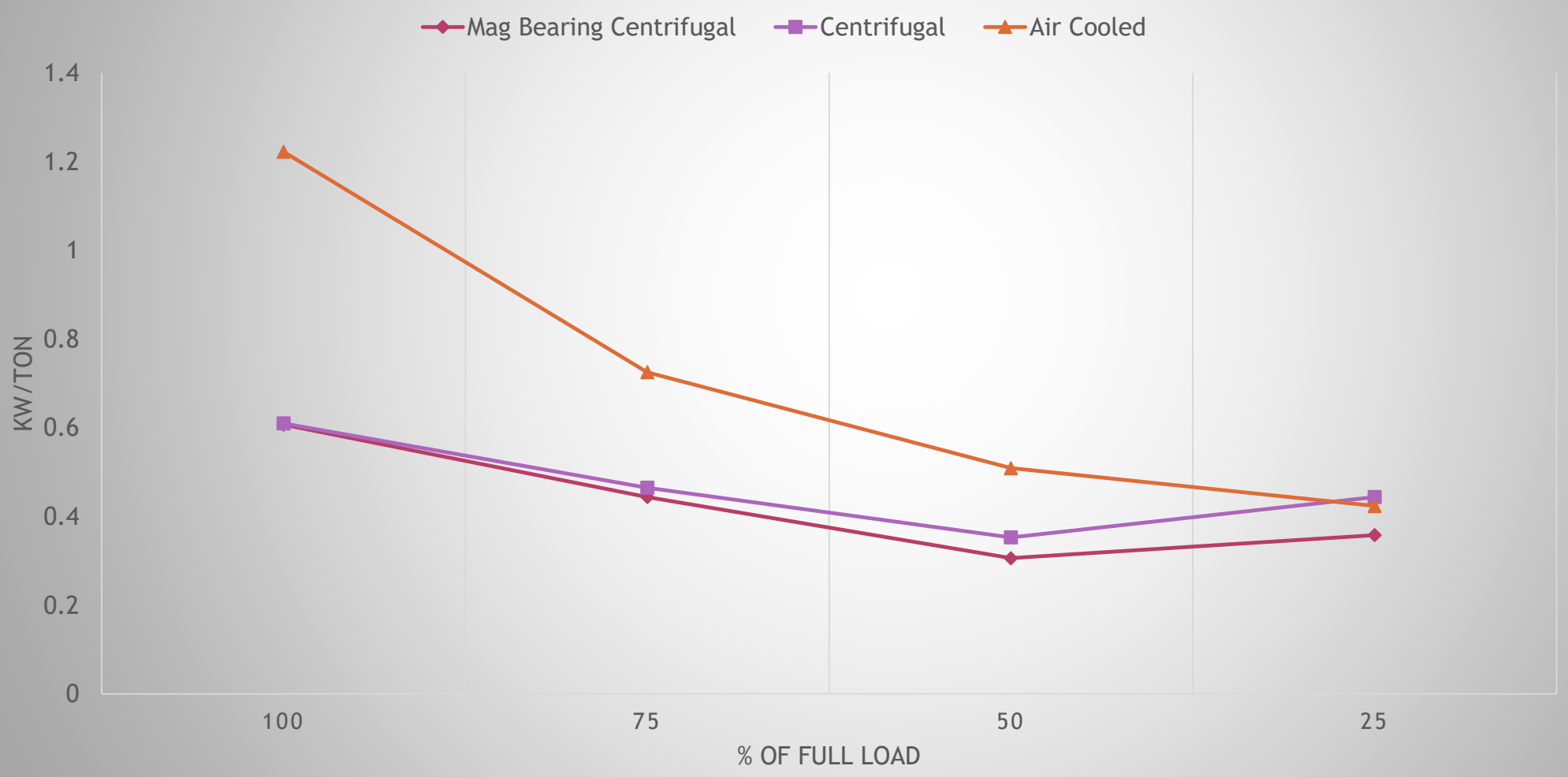


VRV SYSTEMS



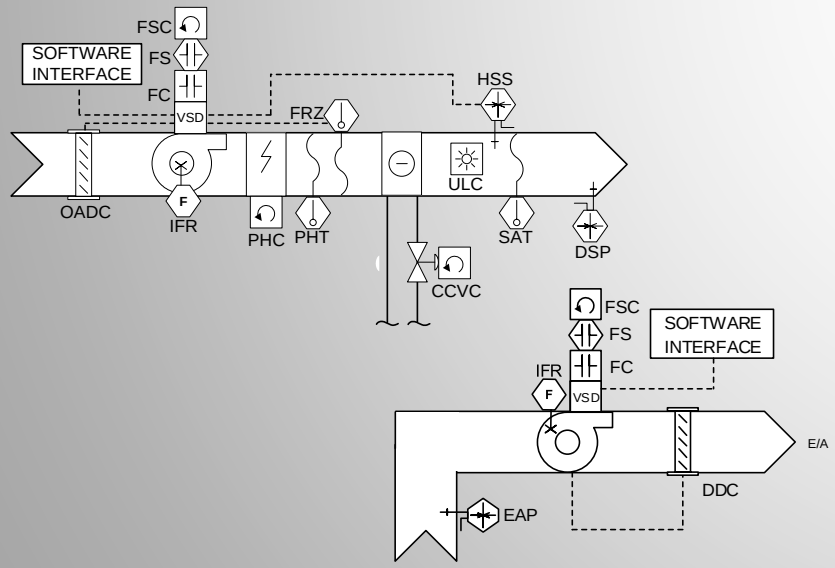
- Growing trend.
- Use variable speed condenser at roof.
- Similar to home A/C.
- Good idea in concept but increases amount of equipment to maintain.

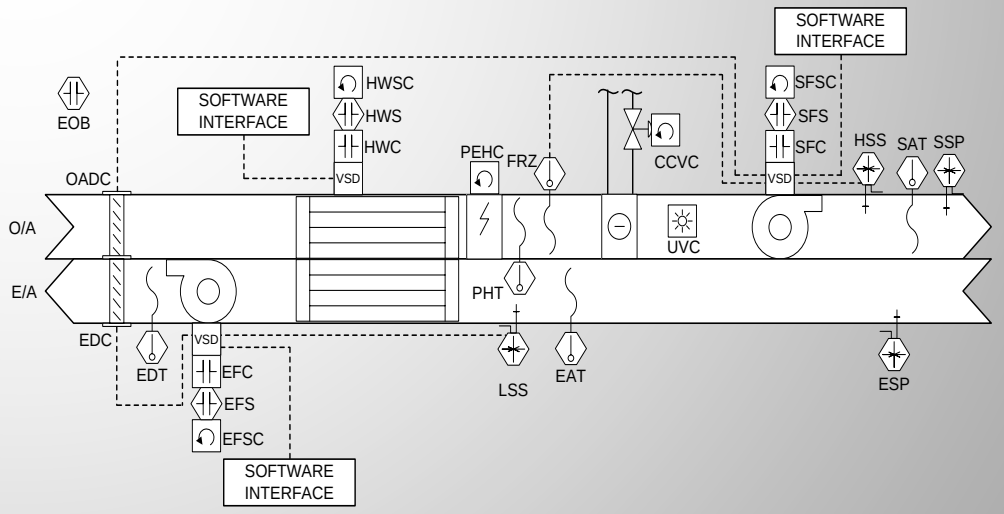
CHILLER EFFICIENCY COMPARISON



OUTSIDE AIR AND TOILET EXHAUST REQUIREMENTS

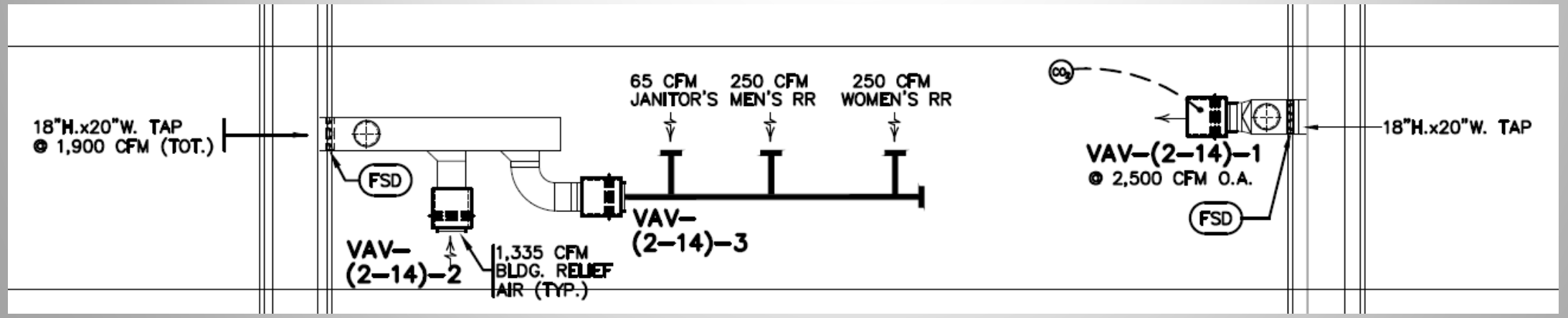
- Minimum flowrates required by code.
- Typically based on a CFM/square foot or air changes/minute.
- Can keep completely separate or use energy recovery for increased efficiency.





DEMAND CONTROL VENTILATION

- Allows building to use less outside air by monitoring space CO2.
- Significant energy savings by conditioning less outside air.
- Requires exhaust flows to track outside air to equalize pressures between floors.

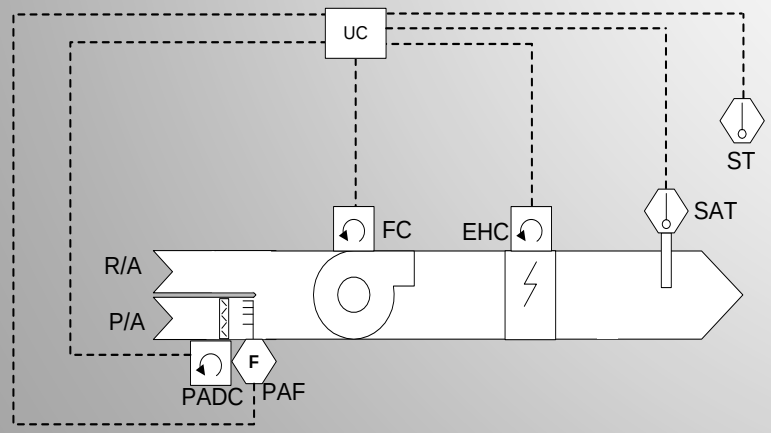


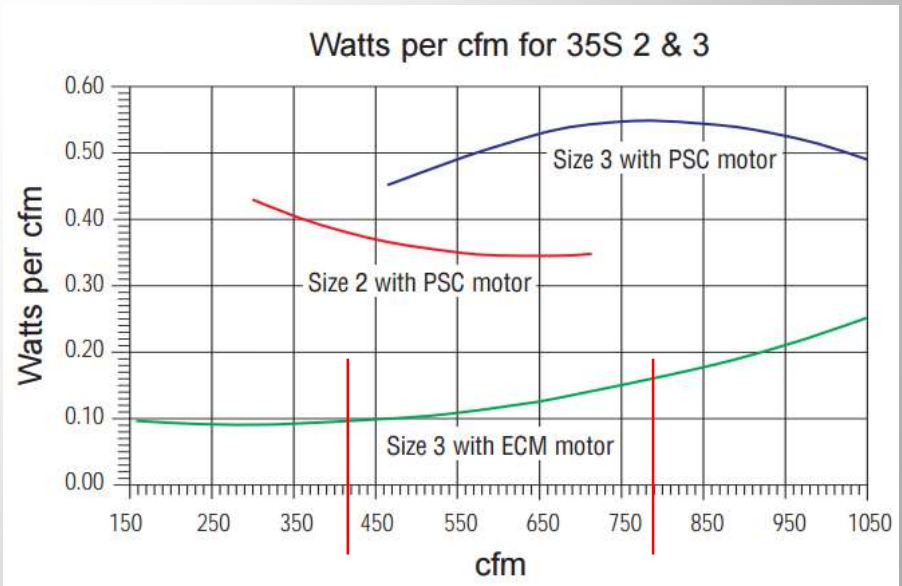
CHILLED WATER AHU VS. WATER COOLED DX AHU

- Chilled Water AHU
  - Tighter temperature control.
  - Lower discharge air temperature.
  - Typically more expensive solution.
  - Typically utilize third party BMS to control unit.
- Water Cooled DX AHU
  - Staged compressors cause greater temperature swings.
  - Lower limit for discharge air temperature typically 52 Deg. F.
  - Typically provided with packaged controls from AHU manufacturer with interface to BMCS.
  - Starting to implement VSD for one stage to reduce temperature swings.

FAN POWERED TERMINAL UNITS

- Electronically Commutated Motors (ECM):
  - Can be used as constant speed or variable speed.
  - Variable speed control increases efficiency and reduces noise.
- SCR Heat:
  - Staged heat causes wider temperature swings.
  - SCR controllers slightly more expensive.

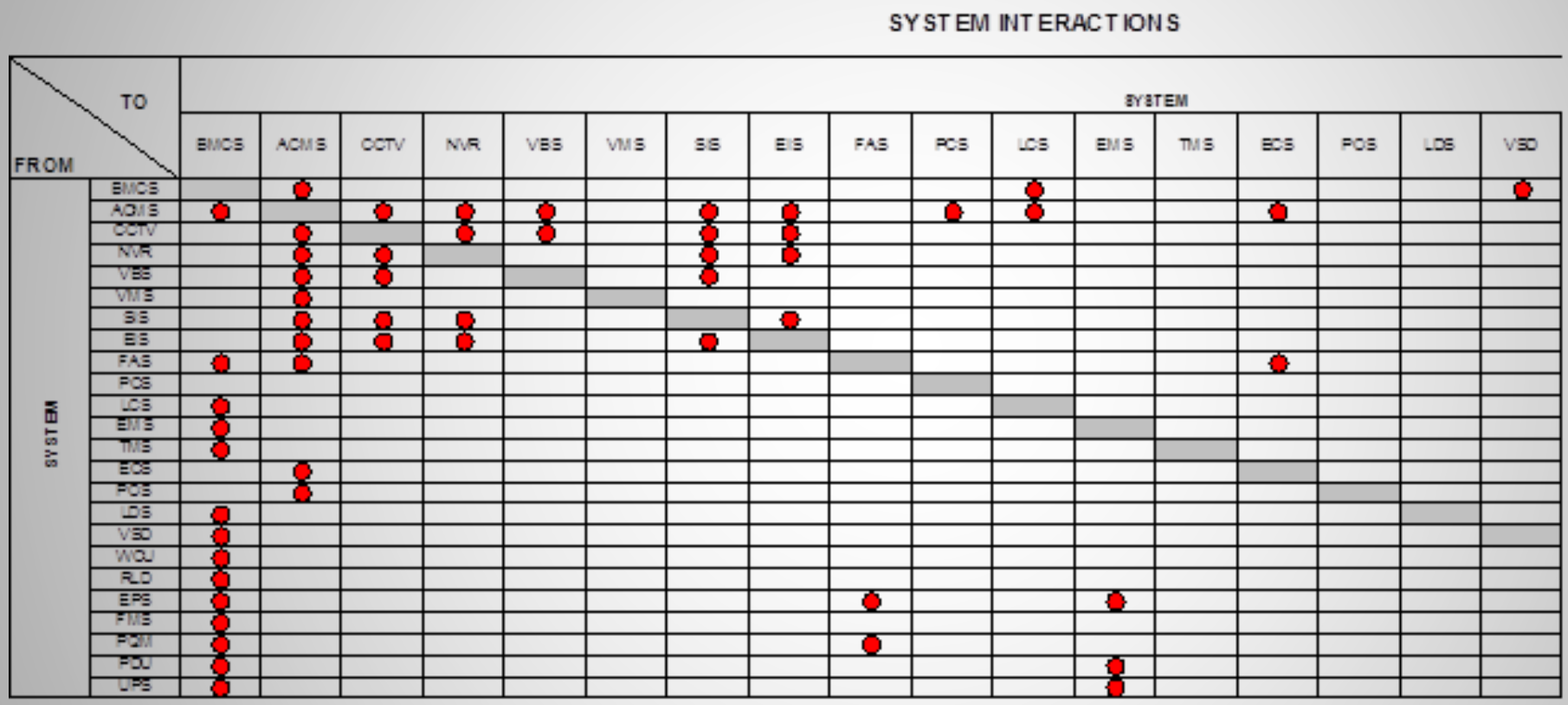




“SMART” BUILDINGS

- “Smart” Buildings and “Integrated” Buildings are broad terminologies:
  - Single platform for all buildings systems?
  - A BMCS interfacing to switchgear, variable speed drives, chillers, electrical meters?
  - Integrated building network supporting BMCS, security, telecom, etc?

WHAT TO INTEGRATE?



BMCS	BUILDING MANAGEMENT AND CONTROL SYSTEM
ACMS	ACCESS CONTROL AND MONITORING SYSTEM
CCTV	CLOSED CIRCUIT TELEVISION SYSTEM
NVR	NETWORK VIDEO RECORDING
VBS	VIDEO BADGING SYSTEM
VMS	VISITOR MANAGEMENT SYSTEM
SIS	SECURITY INTERCOM SYSTEM
EIS	EMERGENCY INTERCOM SYSTEM
FAS	FIRE ALARM SYSTEM
POS	PARKING CONTROL SYSTEM
LCS	LIGHTING CONTROL SYSTEM
EMS	ELECTRICAL METERING SYSTEM
TMS	THERMAL METERING SYSTEM
ECS	ELEVATOR CONTROL AND MONITORING SYSTEM
POS	POINT OF SALE
LDS	LEAK DETECTION SYSTEM

BMCS PROTOCOLS

- Require the specified system to utilize industry standard open protocols.
- “Open” Protocols:
  - BACnet TCP/IP and BACnet MS/TP.
  - LonWorks.
  - Modbus IP and RTU.
- Proprietary Protocols:
  - JCI N2.
  - Apogee P1.
  - ARCnet.

HMA CONSULTING SERVICES

- Security
- Building Automation
- Fire Alarm
- Information Technology
- Audio Visual
- Intelligent and Integrated Systems
- Structured Cabling
- Paging Systems

PROJECT PORTFOLIO

- Corporate Headquarters
- Airports
- Athletic and Recreational Centers
- High Rise Office Buildings
- Research and Laboratory
- Computing and Data Centers
- Correctional and Custodial Facilities
- Professional/Collegiate Sports Facilities
- Banking and Financial Centers
- Convention and Assembly
- Retail Shopping Centers
- Hospitals and Health Centers
- Telecommunication Service Centers
- Industrial Environments
- Office Parks
- Educational Establishments and Campus Facilities
- Agricultural Research Centers
- Television & Satellite Broadcast Centers
- Parking Facilities
- Courthouse/Law Enforcement Facilities
- Generation Facilities
- Transportation Centers

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