



CARBON FOOTPRINT



MONTH 1 - THE ENERGY CONSERVATION OPPORTUNITY: Special Procedures — Constant Volume Occupied and Unoccupied Mode of Operation

ORIGINAL BASIS OF DESIGN (BoFD) - 1998

Original Design Intent – Central air system serving 5,400 sq ft of pharmaceutical space

System	Capacity	Months online	Hrs of operation	ATC controls
Chilled water	120 Tons	Jan through Dec	24 hrs/day	With low ambient control to 0°F
Hot water	100 bhp	Jan through Dec	24 hrs/day	Two-way valves, fixed HWS temperature

Pumps Flow	Flow	GPM	Pump Head	Balancing Valve Setting	Motor	Pump Flow
Chilled water	290	2.4/ton	95 ft	70% open	Original	Constant
Hot Water	340	3.4/bhp	70 ft	70% open	Original	Constant

Central Air Unit	Total cfm	OA cfm	Exh cfm	Total Static Pressure	Hrs of Operation	Remarks
CAHU-1 (SAF-1)	18,000	9,000	----	6 in.	24 hrs/day	
CAHU-1 (RAF)	16,000	----	7,000	2 in.	24 hrs/day	

Chilled Water Temperatures	Hot Water Temperatures
45°F CHWS and 55° CHWR	190° HWS and 170° HWR

New BoFD - Central air system variable flow design to continue to ensure special procedure room design intent while trimming fan hp energy consumption via VFD and addition of VAV terminals with reheat coils to maintain temperature, humidity, and space pressure control. Building chilled water and hot water supply temperature control shall be enhanced to raise chilled water supply temperature when practical during the heating season. Hot water heating system will also be enhanced to take advantage of compensated hot water system temperature control during the A/C months.

NEW 2012 BoFD

System	Capacity	Months online	Hrs of operation	ATC controls
Chilled water	120 tons	Jan through Dec	24 hrs/day	Compensated CHWS temperature
Hot water	100 bhp	Jan through Dec	24 hrs/day	With compensated HWS temperature

Pumps Flow	Flow	GPM	Pump Head	Balancing Valve Setting	Motor	Pump Flow
Chilled water	290	2.0/ton	60 ft	100% open	Original	with VFD
Hot water	340	3.4/bhp	40 ft	100% open	Original	with VFD

Central Air Unit	Total cfm	OA cfm	Exh cfm	Total Static Pressure	Hrs of Operation	Remarks
CAHU-1 (SAF-1)	18,000	9,000	----	6 in.	24 hrs/day	with VFD fan
CAHU-1 (RAF)	16,000	----	7,000	2 in.	24 hrs/day	with VFD fan

Chilled Water Temperatures	Hot Water Temperatures
45°F CHWS and 57° CHWR	190° HWS and 150° HWR at or above 50° outdoor air temp.

ENERGY RETRO-Cx REPORT/RECOMMENDATION/IMPLEMENTATION OPPORTUNITIES

ECM1: Constant volume air system can be enhanced with VAV terminals at the room to maintain space pressure while fine-tuning the supply air delivery to the room.

ECM2: Add flow measuring stations for the return air/exhaust air system to track the supply air system.

ECM3: Add VFDs to the fans SAF-1 and RAF to reduce electrical fan consumption while fine-tuning the space pressure control of the special procedure space. VFD control will also respond to filters loading and increase fan speed to maintain special procedure room positive pressure control.

ECM4: Complete hydraulic model and reduce and rebalance the chilled water and hot water systems, and open up the associated pump discharge balancing to 100% while adjusting design flow via the VFD.

ECM5: Enhance CHW and HW management, including assessing the potential for dry cooler economizer enhancement to the air cooled water chiller.