

# COMPLEX HVAC SYSTEM EXAMPLE

## Building and Mechanical HVAC Zone Information

Complete the information below. Copy and use additional forms, if needed.

Building name: PACIFIC TOWER Gross square footage (ft<sup>2</sup>) 400,000

Zone 1 name: SUITE 110 SW Occupant density (people/1000 ft<sup>2</sup>) 7

Type of Control for Zone 1 (electrical, pneumatic, DDC) DDC

Space Type (Use) 1: OFFICE Net Ft<sup>2</sup> 900 Hrs of Mechanical Operation 6AM-6PM M-F  
6AM-12PM SAT

Space Type (Use) 2: \_\_\_\_\_ Net Ft<sup>2</sup> \_\_\_\_\_ Hrs of Mechanical Operation OFF SUN, & HOL.

Space Type (Use) 3: \_\_\_\_\_ Net Ft<sup>2</sup> \_\_\_\_\_ Hrs of Mechanical Operation \_\_\_\_\_

Zone 2 name: SUITE 110 <sup>SMALL</sup> CONF RM Occupant density (people/1000 ft<sup>2</sup>) 25

Type of Control for Zone 2 (electrical, pneumatic, DDC) DDC

Space Type (Use) 1: CONF. RM Net Ft<sup>2</sup> 212 Hrs of Mechanical Operation 6AM-6PM M-F  
6AM-12PM SAT

Space Type (Use) 2: \_\_\_\_\_ Net Ft<sup>2</sup> \_\_\_\_\_ Hrs of Mechanical Operation OFF SUN & HOL.

Space Type (Use) 3: \_\_\_\_\_ Net Ft<sup>2</sup> \_\_\_\_\_ Hrs of Mechanical Operation \_\_\_\_\_

Zone 3 name: ~~OFF~~ SUITE 110 OFFICE Occupant density (people/1000 ft<sup>2</sup>) 3

Type of Control for Zone 3 (electrical, pneumatic, DDC) DDC

Space Type (Use) 1: OFFICE Net Ft<sup>2</sup> 800 Hrs of Mechanical Operation 6AM-6PM M-F  
6AM-12PM SAT

Space Type (Use) 2: \_\_\_\_\_ Net Ft<sup>2</sup> \_\_\_\_\_ Hrs of Mechanical Operation OFF SUN

Space Type (Use) 3: \_\_\_\_\_ Net Ft<sup>2</sup> \_\_\_\_\_ Hrs of Mechanical Operation \_\_\_\_\_

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## Heating Systems Controls Operation Review

Heating System Type (e.g., boiler, furnace, packaged unit, gas pack): BOILER

Zones Served ALL Ft<sup>2</sup> Served by System 400,000 Fuel Type: NAT. GAS

Complete this section for a boiler or gas furnace. If you do not have a boiler or gas furnace, check the box below and proceed to the next system review worksheet.

No Boiler or Furnace

Date of Review	Item	List the measurement for each item, or provide a comment
1/17/18	Stack or flue temperatures	300°F
1/17/18	Water Temperature or Steam Pressure	170°F
1/17/18	Outside Air Temperature	40°F
1/17/18	Water Treatment Amounts	SERVICE CO. CHECKS QUARTERLY
1/17/18	Frequency and Length of Blowdowns	N/A HYDRONIC BOILER
1/17/18	Water Usage (if metered)	N/A
1/17/18	Firing Temperature or Pressures for On/Off Cycles	OBSERVED ON @ 168°F OFF AT 172°F
1/17/18	Firing rate (e.g., On-Off, Staged, or Modulating)	2-STAGE LOW/HIGH FIRE
1/17/18	Boiler Room Temperature and OSA Control	75°F
1/17/18	Percentage of oxygen in the stack	NOT AVAILABLE. COMBUSTION TEST UNKNOWN.

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BOC® Level I Project Workbook

Assignment 4: HVAC Controls Review

## Ventilation Control Systems Review

Ventilation System (e.g., mechanical, natural, dedicated outdoor air system): VAV AIRHANDLER 1-1

Review Date	Item	List the measurement for each item
1/17/18	% Outside Air (OSA)	20% PER DDC SYSTEM
1/17/18	Frequency of Filter Change	QUARTERLY
1/17/18	Coil Cleaning Frequency	ANNUAL

## Cooling Systems Controls and/or Heat Pump Controls Review

If you do not have a cooling system or heat pump, check the box and proceed to the control systems review worksheet.

Cooling System Type: CHILLED WATER Ft<sup>2</sup> Served by System \_\_\_\_\_ Fuel Type: \_\_\_\_\_

Zones Served: VAV 1-1 SERVES VAV TERMINALS 1-8 1-9 1-10

Date of Review	Item	List the measurement for each item
7/17/18	Zone Temperature: Return air temperature (RAT): Supply air temperature (SAT): Outside Air Temp (OAT): Difference between RAT and SAT:	73°F 74°F 56°F (PER DDC SYSTEM) 78°F 18°F
7/17/18	Temperatures Across Condenser Coils	75°F EWT 87°F LWT
7/17/18	Frost on Suction Line During Cooling? (uncommon)	N/A
7/17/18	Compressor Temperature (warm @ bottom and cool @ top but no frost)	N/A CENTRIFUGAL CHILLER
7/17/18	Identify Refrigerant	R134
7/17/18	Compressor Cycle Rate	NO CYCLING WAS OBSERVED

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## Control Systems Review

In this section, you will compare the programmed control setting to the actual operation of the system. The question we want to answer is "When the control sequence of operation indicates an action, does the system respond as the controller indicates?" Select one system (e.g., heating, or cooling) for review.

System Type reviewed: DDC ALERTON Building Name: PACIFIC TOWER

Date of review: 1/17/18 Type of Control (electrical, pneumatic, DDC): DDC

	Reviewed Item
	<p>1. Describe the HVAC operating schedule and setpoints for the occupied mode.</p> <p>Occupied mode (days of week &amp; hours of day): <u>M-F 6am - 6pm</u>  <u>SAT 6am - 12pm OFF SUN &amp; HOLIDAYS</u></p> <p>Occupied mode heating/cooling setpoint: <u>70 / 74°F</u></p> <p>2. Write the sequence of operation for the occupied mode.</p> <p><u>VAV FAH RUNS CONTINUOUS &amp; SUPPLIES 55°F</u>  <u>AIR TO TERMINAL UNITS. VAV TERMINAL UNITS VARY</u>  <u>AIR BASED ON COOLING DEMAND, HOT WATER FOR REHEAT</u></p> <p>Is there an economizer? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Economizer control type: <u>DRY BULB</u> Changeover temp: <u>65°F</u></p> <p>3. Describe how the programmed sequence of operation above compares to actual operation. (For example, is the heating/cooling temp setpoint occurring when it should?).</p> <p><u>PER DDC SYSTEM ZONE TEMPERATURES</u>  <u>ARE WITHIN THE SETPOINTS</u></p> <p>4. Describe the steps you took to test the system to verify the actual operation?</p> <p><u>OBSERVED GHI &amp; SCREEN CHECK</u></p> <p>List measurement instruments you used: <u>LASER THERMOMETER</u></p>