Cooling Coil Schedule

Coil No.	Unit or System Served	Flow, cfm	Maximum Fins per Inch	Rows	Minimum Face Area, sq.ft.	Airside Performance						Waterside Performance					Comments
						Entering Air		Leaving Air		Face Velocity, fpm	Pressure Drop, in.w.c.	Entering Water Temperature, °F	Leaving Water Temperature, °F	Flow Rate, gpm	Pressure Drop, ft.w.c.	Tons	
						Dry bulb, °F	Wet bulb, °F	Dry bulb, °F	Wet bulb, °F								
CC-1	AHU1 - Hotel Lobby and Administration	26,000	8	6	52.0	81.0	63.8	51.0	50.5	433	0.63	42.0	56.0	141.0	8.6	82.2	
CC-2	Main Ball Room	20,000	9	6	40.0	86.6	66.1	51.4	50.9	500	0.82	42.0	54.0	148.7	11.0	74.4	
CC-3	Junior Ball Room	15,000	8	6	30.0	80.2	63.5	51.7	51.1	500	0.74	42.0	54.0	88.7	9.2	44.3	
CC-4	Meeting Rooms	15,000	8	6	30.0	90.3	67.6	52.2	51.6	500	0.83	42.0	54.0	120.1	9.1	60.1	
CC-5	Corridor Make-up Air	21,225	8	6	42.5	90.3	67.6	52.8	52.0	500	0.76	42.0	54.0	166.4	6.9	83.2	
CC-6	Corridor Make-up Air	21,225	8	6	42.5	90.3	67.6	52.8	52.0	472	0.70	42.0	54.0	166.4	6.9	83.2	
CC-7	Back of House	10,000	8	6	20.0	81.3	65.0	53.9	53.3	500	0.75	42.0	54.0	57.9	3.1	29.0	
CC-8	Breakfast/Lunch Café	6,500	8	6	13.0	82.7	64.5	50.9	50.4	406	0.56	42.0	54.0	43.9	7.8	21.9	
CC-9	Restaurant and Lounge	11,500	8	6	23.0	82.7	64.5	51.8	51.2	479	0.70	42.0	54.0	73.7	9.3	36.9	
CC-10	Main Kitchen	19,000	8	6	38.0	88.5	67.6	51.5	51.0	396	0.56	42.0	54.0	157.2	9.2	78.6	
VF-1	Electrical Room	8,200	8	3	16.4	83.7	67.6	60.7	57.9	410	0.35	42.0	54.0	42.5	9.8	21.2	
CC-GR01	Typcial North Exposure Guest Room (272 thus)	300	14	3	1.4	72.0	60.0	49.4	49.0	214	0.15	42.0	48.6	2.7	3.5	0.7	
CC-GR02	Typcial East Exposure Guest Room (44 thus)	400	14	3	1.4	72.0	60.0	51.2	50.5	285	0.22	42.0	49.4	2.8	3.7	0.9	
CC-GR03	Typcial South Exposure Guest Room (224 thus)	600	14	3	2.2	72.0	60.0	50.4	49.8	275	0.21	42.0	50.1	4.1	9.7	1.4	
CC-GR04	Typcial West Exposure Guest Room (22 thus)	400	14	3	1.4	72.0	60.0	51.2	50.5	285	0.22	42.0	49.4	2.8	3.7	0.9	
CC-GR05	Typcial Luxury Guest Room (4 thus)	1,000	14	3	3.2	72.0	60.0	51.2	50.4	313	0.26	42.0	50.3	6.3	8.9	2.2	

Notes   All selections based on Greenheck

Pump Schedule

Pump Number	Unit or System Served	Make	Model	Flow, gpm	Head, ft.w.c.	Impeller Diameter, in.	Rpm	Bhp	Minimum Pump Efficiency	Motor			Comments
										Hp	Volts	Phase	
CHWP-01	Chiller 01 Evaporator Pump	Bell and Gossett	1510 6G	1,100	40	10-7/8	1,150	13.6	82.1%	15.0	480.0	3.0	
CHWP-02	Chiller 02 Evaporator Pump	Bell and Gossett	1510 6G	1,100	40	10-7/8	1,150	13.6	82.1%	15.0	480.0	3.0	
CHWP-03	Chilled Water Distribution Pump	Bell and Gossett	1510 5A	1,100	90	6	3,550	34.7	72.0%	40.0	480.0	3.0	Note 1,3
CHWP-04	Chilled Water Distribution Pump	Bell and Gossett	1510 5A	1,100	90	6	3,550	34.7	72.0%	40.0	480.0	3.0	Note 1, 3
CWP-01	Chiller 01 Condenser Pump	Bell and Gossett	1510 6E	1,650	84	10-1/4	1,770	40.7	85.9%	50.0	480.0	3.0	Note 2
CWP-02	Chiller 02 Condenser Pump	Bell and Gossett	1510 6E	1,650	84	10-1/4	1,770	40.7	85.9%	50.0	480.0	3.0	Note 2

Notes

1. VFD Rated Motor
2. Pump selection allows for the head required for the future addition of a 550 ton absorptoin chiller
3. Revision 1, VE Analysis

Chiller Schedule

Chiller Number	Unit or System Served	Make	Model	Nominal Tons	Evaporator				Condenser				kW/ton	Motor			Comments
					Flow, gpm	Entering Temperature, °F	Leaving Temperature, °F	Pressure Drop, ft.wc.	Flow, gpm	Entering Temperature, °F	Leaving Temperature, °F	Pressure Drop, ft.wc.		kW	Volts	Phase	
CH-1	Chiller 01	Train	CVHF0570	550	1,100	54.0	42.0	9.76	1,650	85.0	94.3	15.45	0.52	286.0	480.0	3.0	Note 3 4
CH-2	Chiller 02	Train	CVHF0570	550	1,100	54.0	42.0	9.76	1,650	85.0	94.3	15.45	0.56	309.2	480.0	3.0	Note 1, 2

Notes

1. With adjustable frequence drive
2. With hot gas bypass
3. With free standing Y-Delta closed transition starter
4. Revision 1, VE Analysis

Cooling Tower Schedule

Cooling Tower Number	Unit or System Served	Make	Type	Model	Nominal Tons	Flow, gpm	Entering Temperature, °F	Leaving Temperature, °F	Approach Temperature, °F	Rating Wet Bulb Temperature, °F	Airflow, cfm	Fan Speed, rpm	Sound Power, dBA	Lift, ft.w.c.	gpm/hp	Heat Rejection, Btu/hr	Motor				Comments
																	Hp	Speed	Volts	Phase	
CT-1	Cooling Tower 01	Gnarly	Induced Draft, Cross Flow	NC8409PAS1-420	550	1,873	95.0	85.0	12.10	72.9	139,200	214	71	12.3	132	9,332,200	15.0	1,200	480	3	Note 1, 2, 3
CT-2	Cooling Tower 02	Gnarly	Induced Draft, Cross Flow	NC8409PAS1-420	550	1,873	95.0	85.0	12.10	72.9	139,200	214	71	12.3	132	9,332,200	15.0	1,200	480	3	Note 1, 2, 3

Notes

1. Selection based on serving CH-01, CH-02 and a future nominal 550 to absorptoin chiller by adding a third identical cell. For this project, set up the towers for 1,650 gpm of flow per cell
2. With variable speed drive; coordinate with tower vandor for minimum speed, include bypass box assembly.
3. Revision 1, VE Analysis

Schedules

Chilled Water System Point List

Point Name	AI	AO	DI	DO	Virtual	Network	Sensor Type	Comment
Evaporator pump start-stop				X			Relay	Typical of 2
Evaporator pump proof-of-operation			X				Current switch	Typical of 2, Note 5
Distribution pump start-stop				X			Relay	Typical of
Distribution pump proof-of-operation			X				Current switch	Typical of 2, Note 5
Distribution pump speed command		X					Moneyhell Standard	Typical of 2
Distribution pump speed feedback						X	Network Point	Typical of 2, Notes 1, 5
Distribution pump VFD fault						X	Network Point	Typical of 2, Notes 1, 5
Distribution pump kW						X	Network Point	Typical of 2, Notes 1, 5
Distribution pump amps						X	Network Point	Typical of 2, Notes 1, 5
Distribution pump acceleration time						X	Network Point	Typical of 2, Notes 1, 5
Distribution pump deceleration time						X	Network Point	Typical of 2, Notes 1, 5
Chilled water distribution system plant header differential pressure	X						Moneyhell Standard	Note 2
Chilled water differential pressure - 1st floor south mechanical room	X						Moneyhell Standard	Notes 2, 3, 5
Chilled water differential pressure - 1st floor north mechanical room	X						Moneyhell Standard	Notes 2, 3, 5
Chilled water differential pressure - elevator machine room	X						Moneyhell Standard	Notes 2, 3, 5
Chilled water flow	X						Differential pressure	Note 2, 4, 5
Chilled water system supply temperature	X						Moneyhell Standard	Note 5
Chilled water system return temperature	X						Moneyhell Standard	Note 5
Chilled water system return temperature - 1st floor south mechanical room	X						Platinum RTD with xmtr.	
Chilled water system return temperature - 1st floor north mechanical room	X						Platinum RTD with xmtr.	
Chilled water system return temperature - elevator machine room	X						Platinum RTD with xmtr.	
Chilled water bypass temperature	X						Platinum RTD with xmtr.	
Chiller entering chilled water temperature	X						Moneyhell Standard	Typical of 2, Note 5
Chiller leaving chilled water temperature	X						Moneyhell Standard	Typical of 2, Note 5
Chiller enable				X			Relay	Typical of 2
Chiller supply temperature set point command		X					Moneyhell Standard	Typical of 2
Chiller demand limit		X					Moneyhell Standard	Typical of 2, Note 5
Chiller status						X	Network Point	Typical of 2, Note 5
Chiller amps						X	Network Point	Typical of 2, Note 5
Chiller kW						X	Network Point	Typical of 2, Note 5
Chiller VFD speed						X	Network Point	Typical of 2, Note 5
Chiller inlet vane position						X	Network Point	Typical of 2, Note 5
Chiller evaporator temperature						X	Network Point	Typical of 2, Note 5
Chiller evaporator pressure						X	Network Point	Typical of 2, Note 5
Chiller oil pressure						X	Network Point	Typical of 2, Note 5
Chiller crankcase heater status						X	Network Point	Typical of 2, Note 5
Chiller purge condenser status						X	Network Point	Typical of 2, Note 5
Chiller hours						X	Network Point	Typical of 2, Note 5
Chiller starts						X	Network Point	Typical of 2, Note 5
Chiller purge condenser hours						X	Network Point	Typical of 2, Note 5
Chiller hot gas bypass valve position						X	Network Point	Typical of 2, Note 5
Chiller fault						X	Network Point	Typical of 2, Note 5
Chiller VFD fault						X	Network Point	Typical of 2, Note 5
Chiller flow rate						X	Network Point	Typical of 2, Note 5
Chiller tons						X	Network Point	Typical of 2, Note 5
Chiller hours of operation					X		N/A	Typical of 2, Note 5
Evaporator pump hours of operation					X		N/A	Typical of 2, Note 5
Distribution pump hours of operation					X		N/A	Typical of 2, Note 5

Note 1 - Furnish and install a network card compatible with the Moneyhell system network protocol and map the indicated points across the interface.
Note 2 - With five valve manifold
Note 3 - Wire to the closest Moneyhell controller and use the network to transmitt the data to the central plant controller.
Note 4 - Coordinate with Division 15 to match flow transmitter span and requirements.
Note 5 - Modified or deleted, VE Study

CHILLER PLANT SEQUENCE OF OPERATION

1. The chiller plant shall run 24/7 to ensure guest satisfaction. The operating team shall have the ability to over-ride the operating schedule as needed.
2. The chilled water plant shall maintain a constant supply water temperature of 42°F under all operating conditions. The operating team shall have the ability to over-ride this set point as needed.
3. The control system shall stage the chillers and distribution pumps as required to ensure maximum efficiency under all operating conditoins. The operating team shall have the ability to over-ride any piece of equipment's operating parameters as needed.
4. Safety interlocks shall be provided as required by the manufactuer. At a minimum, for the chillers, the interlocks shall include a chilled water flow switch and an auxilliary from the associated evaporator pump starter.
5. All motor sterters shall be provided with motor overloads and meet the requirements of the National Electric Code and shall be provided with Hand-Off-Auto switches. Automated control of the motor by the control system shall occur with the switch in the "Auto" position. The "Hand" position shall allow the operator to over-ride the control system. Regardless of the position of the selector switch, all safety devices shall function.
6. All safety interlocks shall be hard wired. Software based safeties shall not be accepted.
7. Provide trending and trend archiving capabilities only. Trends to be set up as required by the operating team subsequent to construciton.
8. Provide high alarm high warning alarm, low warning alarm and low alarm capabilities only. Alarms to be set up as required by the operating team subsequent to construction.

Condenser Water System Point List

Point Name	AI	AO	DI	DO	Virtual	Network	Sensor Type	Comment
Condenser pump start-stop				X			Relay	Typical of 2
Condenser pump proof-of-operation			X				Current switch	Typical of 2, Note 7
Cooling tower fan low speed command				X			Relay	Typical of 2, Notes 6, 7
Cooling tower fan high speed command				X			Relay	Typical of 2, Note 7
Cooling tower fan low speed proof-of-operation			X				Current switch	Typical of 2, Note 7
Cooling tower fan high speed proof-of-operation			X				Current switch	Typical of 2, Note 7
Cooling tower make up flow			X				Meter pulser	Note 7
Cooling tower blow down flow			X				Meter pulser	Note 7
Cooling tower TDS level	X						Note 1	Note 7
Cooling tower pH	X		X				Note 1	Note 7
Condenser water flow	X						Differential pressure	Note 2, 4, 7
Condenser water system supply temperature	X						Moneyhell Standard	Note 7
Condenser water system return temperature	X						Moneyhell Standard	Note 7
Cooling tower cold basin water temperature	X						Platinum RTD with xmtr.	Typical of 2, Note 7
Condenser water bypass temperature	X						Platinum RTD with xmtr.	Note 7
Cooling tower make up valve command							Warrick	Note 5, 7
Cooling tower low level alarm							Warrick	Note 7
Cooling tower high level alarm							Warrick	Note 7
Cooling tower basin heat control				X			Relay	Typical of 2, Note 3, 7
Cooling tower basin heat proof-of-operation	X						Current Transformer	Typical of 2, Note 3
Chiller entering condenser water temperature	X						Moneyhell Standard	Typical of 2, Note 7
Chiller leaving condenser water temperature	X						Moneyhell Standard	Typical of 2, Note 7
Chiller condenser temperature						X	Network Point	Typical of 2, Notes 1, 7
Chiller condenser pressure						X	Network Point	Typical of 2, Notes 1, 7

Note 1 - Coordinate with the water treatment vendor to pick up a signal from their controller.
Note 2 - With five valve manifold
Note 3 - Furnish a load break rated disconnect. The operating team shall manually turn on basin heat as needed.
Note 4 - Coordinate with Division 15 to match flow transmitter span and requirements.
Note 5 - Furish and install Watts heavy duty mechanical float valve or equal, one per cell.
Note 6 - Provide a start-stop point for the single speed starters associated with the VE study.
Note 7 - Modified or Deleted, VE Study

CONDENSER WATER SYSTEM SEQUENCE OF OPERATION

1. The condenser water system shall run as required to support the operation of the chiller plant. The operating team shall have the ability to over-ride the operating schedule as needed.
2. The condenser water plant shall maintain a constant supply water temperature of 85°F under all operating conditions. The operating team shall have the ability to over-ride this set point as needed.
3. The control system shall stage the cooling tower fans and condenser pumps as required to ensure maximum efficiency under all operating conditoins. The operating team shall have the ability to over-ride any piece of equipment's operating parameters as needed.
4. Safety interlocks shall be provided as required by the manufacturer. At a minimum, for the cooling towers, the interlocks shall include a vibration switch.
5. All motor sterters shall be provided with motor overloads and meet the requirements of the National Electric Code and shall be provided with Hand-Off-Auto switches. Automated control of the motor by the control system shall occur with the switch in the "Auto" position. The "Hand" position shall allow the operator to over-ride the control system. Regardless of the position of the selector switch, all safety devices shall function.
6. All safety interlocks shall be hard wired. Software based safeties shall not be accepted.
7. Provide trending and trend archiving capabilities only. Trends to be set up as required by the operating team subsequent to construciton.
8. Provide high alarm high warning alarm, low warning alarm and low alarm capabilities only. Alarms to be set up as required by the operating team subsequent to construction.
9. The control system shall cycle the basin heat as required to maintain the cooling tower cold basins at 40°F.
10. The control system shall cycle the make up valve to open it when the basin level is 1 inch above the manufacturer's recommended minimum level and to close when the basin level is 1 inch below the over flow level. The control system shall issue an alarm if the basin level drops to less than the manufacturer's recommended minimum level or rises to with in 1/2 inch of the basin overflow level.
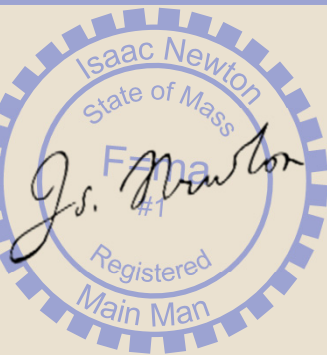
Point Lists,
Sequences

Economizer Equipped Air Handling System Point List

Point Name	AI	AO	DI	DO	Virtual	Network	Sensor Type	Comment
Supply fan start-stop				X			Relay	
Supply fan proof-of-operation			X				Current switch	Note 4 ⚠
Supply fan run hours					X		N/A	Note 4
Outdoor air temperature	X						Moneyhell Standard	Note 4 ⚠
Minimum outdoor air damper command		X					Moneyhell Standard	Note 4
Minimum outdoor air flow	X						Differential Pressure	Notes 1, 4 ⚠
Minimum outdoor air flow set point					X		N/A	Note 4
Maximum outdoor air damper command		X					Moneyhell Standard	Note 2, 4
Return air damper command		X					Moneyhell Standard	Note 2, 4
Relief air damper command		X					Moneyhell Standard	Note 2, 4 ⚠
Building pressure in the area served	X						Differential Pressure	Note 4
Return air temperature	X						Moneyhell Standard	Note 4 ⚠
Mixed air temperature	X						Moneyhell Standard	Note 4
Prefilter pressure drop	X						Moneyhell Standard	Note 4 ⚠
Final filter pressure drop	X						Moneyhell Standard	Note 4
Hot water valve command		X					Moneyhell Standard	
Hot water coil leaving air temperature	X						Moneyhell Standard	Note 4
Fan leaving air temperature	X						Moneyhell Standard	Note 4 ⚠
Chilled water valve command		X					Moneyhell Standard	
Ball room temperature	X						Platinum RTD with xmtr.	Typical of 2, Notes 3, 4 ⚠
Reheat valve command		X					Moneyhell Standard	Typical of 2, Notes 3, 4

Note 1 - Furnish an Air Monitor Velu prob traverse station or equal. Coordinate with Division 15 for installation. Furnish and install a differential pressure based transmitter matched to the characteristics of the traverse station to ensure accuracy and turn-down. ⚠

Note 2 - Use one output to control the outdoor air, return air and relief air dampers.

Note 3 - Furnish and install a pneumatic two pipe thermostat for zone temperature control and a compatable pneumatic valve for the associated reheat coil.

Note 4 - Modified or Deleted, VE Study

ECONOMIZER EQUIPPED AIR HANDLING SYSTEM SEQUENCE OF OPERATION

1. The air handling system shall run on a daily schedule as required to support functions in the area served. The operating staff shall have the capabiltiy to set daily schedules for up to one month in advance of the current date. The schedule shall allow for up to 10 starts and stops for each day of the week.

2. The air handling system shall maintain a constant supply temperature as scheduled on the equipment schedule for the system under all occuppied operating conditions. The operating team shall have the ability to over-ride this set point as needed.

3. The control system shall sequence all of the heat transfer elements in the systems to maximize the efficiency of the system under all operating conditions. Heating elements shall be driven to fully open when the system is off line as a freeze protection measure. Cooling coils shall be driven to fully closed when the system is off. Economizer dampers shall be driven to the full return air position when the system is off. ⚠

4. Safety interlocks shall be provided as required by the manufactuer. At a minimum, for the economizer equipped air handling systems, the interlocks shall include a freeze-stat and a supply and return air smoke detector and fire alarm shut down.

5. All motor sterters shall be provided with motor overloads and meet the requirements of the National Electric Code and shall be provided with Hand-Off-Auto switches. Automated control of the motor by the control system shall occur with the switch in the "Auto" position. The "Hand" position shall allow the operator to over-ride the control system. Regardless of the position of the selector switch, all safety devices shall function.

6. All safety interlocks shall be hard wired. Software based safeties shall not be accepted.

7. Provide trending and trend archiving capabilities only. Trends to be set up as required by the operating team subsequent to construciton.

8. Provide high alarm high warning alarm, low warning alarm and low alarm capabilities only. Alarms to be set up as required by the operating team subsequent to construction. ⚠

Point Lists,
Sequences