

THE HEATING SYSTEM SHALL BE COMPLETELY CONTROLLED BY THE BUILDING AUTOMATION SYSTEM (BAS).

- THE HEATING SYSTEM CONSISTS OF STEAM HEAT EXCHANGER, STEAM VALVE(S), AND TWO PUMPS (ONE PRIMARY AND ONE STANDBY). THE HEATING SYSTEM SHALL BE CONTROLLED AS NOTED BELOW (EACH SET POINT AND SETTING SHALL BE ADJUSTABLE AT THE BAS):
- ALL COMMANDABLE POINTS SHALL INDICATE CURRENT COMMANDED PRIORITY STATUS AT THE BAS (i.e. OPERATOR, EMERGENCY, etcetera )
- ALL LOAD SIDE 2 WAY VALVE SYSTEMS SHALL BE PROVIDED WITH A DDC CONTROLLED MODULATING BYPASS WITH POSITION FEEDBACK TO MAINTAIN MINIMUM FLOW.
- ALL LOAD SIDE 2 WAY VALVE SYSTEMS WHERE THE PUMPS ARE CONTROLLED BY VFD(s) SHALL BE PROVIDED WITH A DIFFERENTIAL PRESSURE SENSOR REPORTING TO THE BAS AT THE FURTHEST POINT IN THE HYDRONIC LOOP, WITH A CONTROL SET POINT (FA) TO ACCOMMODATE PID LOOP CONTROL OF THE PUMP VFD(s). A RETURN PRESSURE SENSOR SHALL ALSO BE INSTALLED IN THIS SAME LOCATION TO HELP DETERMINE WHEN SYSTEMS ARE LOW ON WATER.
- ALL LOAD SIDE 2 WAY VALVE SYSTEMS SHALL BE PROVIDED WITH A BYPASS WITH AN AUTOMATIC BYPASS CONTROL VALVE (PRESSURE INDEPENDENT CONTROL VALVE) TO OPEN WHEN 90% OF THE REHEAT VALVES ARE CLOSED TO MAINTAIN A MINIMUM FLOW RATE (FM), OR A BALANCING VALVE TO MAINTAIN A MINIMUM SYSTEM FLOW TO BE DETERMINED BY THE BALANCER. *[Note to PSC: Balancing valve method will be used for a smaller renovation projects, and BPV Valve Differential pressure relief valve or equivalent will be used].*
- ALL SYSTEM PRESSURES AND FLOW SET POINTS TO BE DETERMINED BY THE BALANCER

#### **HEATING SYSTEM ENABLE / DISABLE:**

THE BAS SHALL ENABLE/DISABLE PARIMITER AND PREHEAT SYSTEMS BASED ON OUTSIDE AIR TEMPERATURE (FA)

- WHEN OUTSIDE AIR TEMPERATURE IS LESS THAN THE ENABLE SET POINT OF 55 DEG.F (FA) THE SYSTEM SHALL BE ENABLED
- WHEN OUTSIDE AIR TEMPERATURE IS 2 DEG.F ABOVE THE ENABLE SET POINT THE SYSTEM SHALL BE DISABLED
- WHEN THE SYSTEM IS ENABLED ALL TEMPERATURE ALARMS SHALL BE INACTIVE AND DELAYED UNTIL THE SYSTEM REACHES LOW TEMPEATURE ALARM THRESHOLD AND THEN BECOME ACTIVE AND ANNUNCIATED AT THE BAS
- WHEN THE SYSTEM IS DISABLED ALL ALARMS SHALL BE INACTIVE WITH THE EXCEPTION OF THE HIGH TEMPERATURE ALARM
- ENABLE/DISABLE OPERATIONAL MODE SHALL BE ANNUNCIATED AT THE BAS
- REHEAT SYSTEMS SHALL STAY ENABLED CONTINUALLY

#### **HOT WATER PUMP START/STOP AND SPEED CONTROL:**

- THE BAS SHALL START/STOP, AND PROVE OPERATION OF THE HOT WATER PUMPS.
- UPON FAILURE OF THE PRIMARY PUMP, BAS SHALL ISSUE A START COMMAND TO THE STANDBY PUMP AND ALARM THE PRIMARY PUMP.
- UPON FAILURE OF THE PRIMARY PUMP, AND THE STANDBY PUMP, THE BAS SHALL CLOSE THE STEAM VALVE(S) AND ALARM BOTH PUMPS.

- IF ANY PUMP IS DISABLED LOCALLY AND THE SYSTEM IS ENABLED THE REMAINING PUMP WILL OPERATE AS PRIMARY UNTIL THE DISABLED PUMP IS ENABLED LOCALLY, AT THAT TIME THE SYSTEM WILL REVERT BACK TO THE ORIGINAL RUN TIME SEQUENCE.

**HEATING VALVE CONTROL:**

VALVE(S) SHALL MODULATE TO MAINTAIN THE HOT WATER SUPPLY TEMPERATURE SETPOINT.

HOT WATER SUPPLY TEMPERATURE SET POINT SHALL BE RESET ON LINEAR TABLE BASED UPON OUTSIDE AIR TEMPERATURE:

- WHEN OUTSIDE AIR TEMPERATURE IS LESS THAN 0 DEG F, HOT WATER TEMPERATURE SET POINT SHALL BE 180 DEG F. (FA)
- WHEN OUTSIDE AIR TEMPERATURE IS MORE THAN 55 DEG F, HOT WATER TEMPERATURE SET POINT SHALL BE 110 DEG F. (FA)

**THE FOLLOWING CONDITIONS SHALL SHUT THE STEAM VALVE AND SHALL INDICATE AN ALARM CONDITION AT THE BAS CENTRAL COMMAND:**

- IF BOTH PRIMARY AND STANDBY HOT WATER PUMP ARE ENABLED TO RUN AND CURRENT STATUS SWITCH MEASURES INSUFFICIENT CURRENT.
- SHOULD THE HOT WATER TEMPERATURE EXCEED 200 DEG F. (FA)

**THE FOLLOWING CONDITIONS SHALL INDICATE AN ALARM AT THE BAS THOUGH ALLOWING THE PUMP TO CONTINUE TO OPERATE:**

- SHOULD THE HOT WATER SUPPLY TEMPERATURE EXCEED 190 DEG F. (FA)
- SHOULD THE HOT WATER SUPPLY TEMPERATURE FALL BELOW 80 DEG F. (FA)
- SHOULD THE HOT WATER RETURN PRESSURE FALL BELOW 3 PSI (FA) FOR 15 MINUTES
- SHOULD THE HOT WATER DIFFERENTIAL PRESSURE VARY FROM SET POINT BY +/- 5 PSI (FA) FOR 15 MINUTES

**WHENEVER HEATING SYSTEM IS SHUT DOWN, THE FOLLOWING SHALL OCCUR:**

- STEAM VALVE(S) SHALL FULLY CLOSE.
- PUMPS SHALL DE-ENERGIZE.
- ALARMS SHALL BE INACTIVE WITH THE EXCEPTION OF THE HIGH TEMPERATURE ALARM

**PUMP ROTATION PROGRAM**

THE PUMPS SHALL ALTERNATE ON THE SECOND TUESDAY OF EVERY MONTH AT 10:00 AM BASIS:

- PRIMARY / STANDBY STATUS SHALL BE ANNUNCIATED FOR EACH PUMP AT THE BAS
- THE PRIMARY PUMP SHALL BE SELECTABLE FROM THE BAS
- IF THE STANDBY PUMP IS PUT IN HAND LOCALLY THE PRIMARY PUMP WILL CONTINUE TO RUN

**REPORTS AND TRENDING**

ALL PHYSICAL INPUTS, OUTPUTS, SET POINTS, AND ALARMS SHALL BE TRENDED

