**DUAL HEAT EXCHANGER SYSTEM CONTROL WITH ISO VALVES AND VARIABLE SPEED PUMPS CONTROL DIAGRAM**

**SEQUENCE OF OPERATION**

**HOT WATER HEATING SYSTEM WITH DUAL HEAT EXCHANGERS AND VARIABLE SPEED PUMPS**

**NOTE:** ALL SETPOINTS AND TIME INTERVAL SETPOINTS DESCRIBED IN SEQUENCE SHALL BE ADJUSTABLE BY SYSTEM OPERATOR. CREATE REQUIRED VIRTUAL POINTS.

1. HOT WATER HEATING SYSTEM PUMPS P-01 AND P-02 SHALL HAVE START STOP CAPABILITY FROM THE DDC SYSTEM. ONE OF THE TWO PUMPS SHALL BE ACTIVATED BY THE DDC TO OPERATE BASED ON OUTDOOR AIR TEMPERATURE. THE OTHER WILL SERVE AS STANDBY. ONE OF THE ISO VALVES SHALL BE OPENED BY THE DDC PRIOR TO PUMP ACTIVATION.

2. DDC SHALL ALTERNATE PUMP OPERATION BASED ON MONTH. EVEN MONTHS THE EVEN NUMBERED PUMP & HK SYSTEM SHALL RUN, AND ODD MONTHS THE ODD NUMBERED PUMP & HK SYSTEM SHALL RUN.

3. DDC SHALL MONITOR OPERATING STATUS OF EACH PUMP THRU HARDWARE CONTACT. UPON PUMP FAILURE, DDC SHALL ACTIVATE FAILURE ALARM AND AUTOMATICALLY START THE STANDBY PUMP. DURING A LOSS OF COMMUNICATION WITH VFD FOR 60 SECONDS, DDC SHALL ACTIVATE FAILURE ALARM AND AUTOMATICALLY START THE STANDBY PUMP.

4. DDC SHALL MODULATE THE ACTIVE PUMP VARIABLE FREQUENCY DRIVE TO MAINTAIN A DIFFERENTIAL PRESSURE AT A SPECIFIED LOCATION WITHIN THE BUILDING. SETPOINT SHALL INITIALLY BE SET TO 25 FT. (ACTUAL SETPOINT SHALL BE DETERMINED DURING SYSTEM COMMISSIONING AND/OR BY THE WATER BALANCE CONTRACTOR).

5. DDC SHALL CONTROL ISOLATION VALVES ASSOCIATED WITH ISO1 AND ISO2. ONE OF THE ISO VALVES SHALL BE ACTIVATED BY THE DDC TO OPERATE CONTINUOUSLY, THE OTHER WILL SERVE AS STANDBY.

6. DDC SHALL ALTERNATE HK SYSTEM OPERATION BASED ON MONTH. EVEN MONTHS THE EVEN NUMBERED HK SHALL RUN, AND ODD MONTHS THE ODD NUMBERED HK SHALL RUN.

7. UPON PUMP PROOF THE ACTUATED HK, DDC SHALL MODULATE HK TEMPERATURE CONTROL VALVES IN SEQUENCE TO MAINTAIN TERMINAL HEATING SUPPLY (THS) TEMP SETPOINT. WHEN THE OUTDOOR AIR TEMPERATURE IS 0 DEGREES F, THE SETPOINT IS 180 DEGREES F AND WHEN THE OUTDOOR AIR TEMPERATURE IS 60 DEGREES F, THE SETPOINT IS 120 DEGREES F.

8. WHEN CHS PUMP P-01 AND/OR P-02 ARE OFF, THE RESPECTIVE HK STEAM VALVES SHALL REMAIN CLOSED.

9. SAFETIES: UPON CONTROLS FAILURE THE PUMPS WILL FAIL OFF. THE STEAM CONTROL VALVES WILL FAIL CLOSED AND HARD-WIRED HIGH TEMPERATURE SENSORS (X-1) AND T-2) WILL BE USED TO CLOSE THE STEAM VALVES WHEN 200 DEGREES F IS EXCEEDED. THERE SHALL ALSO BE A DDC POINT FOR REMOTE ALARMING AND MESSAGING LOCAL PILOT LIGHT INDICATION ON AUXILIARY PANEL FOR ALARM SHALL ALSO BE USED. 24HR ALARMS AND MESSAGES WILL BE USED TO INDICATE PUMP AND SYSTEM FAILURE. DDC TO MONITOR SUPPLY WATER TEMP SENSOR AND ALARM ABOVE 200 DEGREES F AND 40 DEGREES F LOWER THAN CURRENT SETPOINT. AFTER A SUSTAINED 30 MINUTES ALARM CONDITION, A HEATING SYSTEM FAILURE TO BE SENT TO CENTRAL CONTROL, I-MON TO DISPLAY MESSAGING STATEMENT.

**ALARMING**

- SUPPLY WATER TEMPERATURE
- DIFFERENTIAL PRESSURE (> 5% OF SETPOINT)
- ENHANCED 24H
- PUMP FAILURE
- HIGH TEMPERATURE LIMIT