



C1 CHILLED WATER FLOW DIAGRAM
M-801 SCALE: NO SCALE SHOWN

WATER COOLED CHILLED WATER SYSTEM WITH PRIMARY ONLY PUMPING SEQUENCE OF OPERATION

GENERAL:
432PCHW01-A1 AND 432PCHW02-A1 ARE 100% REDUNDANT AND MUST OPERATE IN LEAD/STANDBY CONFIGURATION. EQUIPMENT RUN-TIME OR OPERATOR SELECTION MUST DETERMINE ACTIVE LEAD PUMP.

MINIMUM ALLOWABLE CHILLED WATER FLOW THROUGH SYSTEM IS 95 GPM DUE TO MINIMUM FLOW REQUIREMENTS OF 432RCHS01-A1. FOR REFERENCE ONLY, SYSTEM SHALL OPERATE AT CONSTANT VOLUME (220 GPM).

CHILLED WATER PUMPS MUST BE MONITORED AND CONTROLLED BY THE DDC SYSTEM. 432RCHS01-1 CONTROL FUNCTIONS, SAFETY INTERLOCKS, ALARMS, AND MONITORED PARAMETERS MUST BE MADE AVAILABLE TO AND MONITORED BY THE DDC SYSTEM. THE DDC SYSTEM IS AN AUTOMATED LOGIC CONTROLLER.

CHILLER CONTROL:
DDC SYSTEM SHALL MONITOR THE STATUS OF THE CHILLER AND CHILLED WATER PUMPS AND INITIATE ENABLE/DISABLE COMMANDS TO EACH CHILLER AND PUMP. DDC SYSTEM SHALL ENABLE CHILLER AFTER LEAD CHILLED WATER PUMP STATUS PROVES ON.

THE FACTORY CHILLER CONTROL PANEL (CCP) MUST CONTROL CHILLER AND EXTERNAL CHILLER HEAD PRESSURE CONTROL VALVE TO SATISFY CHILLED WATER SUPPLY TEMPERATURE SETPOINT.

DDC SYSTEM MUST DISABLE CHILLER WHEN LEAD CHILLED WATER PUMP STATUS CHANGES TO OFF.

IF CHILLER IS COMMANDED TO RUN AND COMPRESSOR STATUS IS OFF AFTER A 30 SECOND (ADJ.) DELAY OR CHILLED WATER SUPPLY TEMPERATURE IS GREATER THAN CHILLED WATER SUPPLY TEMPERATURE SEPOINT PLUS 5 DEG. F. (ADJ.) FOR 4 MINUTES (ADJ.), AN ALARM MUST BE SENT TO THE DDC SYSTEM. AFTER A 300 SECOND (ADJ.) DELAY, LEAD CHILLER MUST BE COMMANDED OFF.

CHILLER CONTROL FUNCTIONS, MINIMUM RUNTIME, SAFETY INTERLOCKS, AND MAXIMUM STARTS PER HOUR MUST BE AS RECOMMENDED BY THE CHILLER MANUFACTURER DURING EQUIPMENT STARTUP.

CHILLER MUST AUTOMATICALLY DISABLE AFTER OPERATING AT OR BELOW 25% CAPACITY (CONFIRM GREATER THAN EQUIPMENT TURNDOWN) (ADJ.) FOR 15 MINUTES (ADJ.) CORRESPONDING LEAD CHILLED WATER PUMP MUST REMAIN RUNNING DURING LOW DEMAND, STATUS OF PUMP IS ACCORDING TO USER-DEFINED OPERATING SCHEDULE OR OPERATOR MANUAL START/STOP OVER BAS.

CHILLED WATER PUMP CONTROL:
THE LEAD CHILLED WATER PUMP MUST RUN ACCORDING TO A USER-DEFINED OPERATING SCHEDULE OR OPERATOR MANUAL START/STOP OVER BAS.

PUMP VARIABLE SPEED DRIVE MUST MAINTAIN CONSTANT FLOW (220 GPM) THROUGH SYSTEM BY OPERATING AT CONSTANT SPEED. SPEED CORRESPONDING TO CONSTANT FLOW SETPOINT (220 GPM) TO BE DETERMINED DURING TAB.

IF PUMP IS COMMANDED TO RUN AND COMMON DIFFERENTIAL PRESSURE TRANSDUCER DOES NOT INDICATE PROOF OF FLOW AFTER A 30 SECOND (ADJ.) DELAY, AN ALARM MUST BE SENT TO THE DDC SYSTEM. AFTER A 180 SECOND (ADJ.) DELAY, LEAD PUMP MUST BE COMMANDED OFF AND STANDBY PUMP MUST BECOME LEAD PUMP.

CHILLED WATER FREEZE PROTECTION:
WHEN OUTSIDE AIR TEMPERATURE IS LESS THAN 45 DEG. F. (ADJ.), ENABLE BOTH CHILLED WATER PUMPS. RUN BOTH PUMPS AT LOW SPEED (TO BE DETERMINED DURING TAB) UNTIL OUTSIDE AIR TEMPERATURE IS GREATER THAN 45 DEG. F. (ADJ.)

CONDENSER WATER FLOW CONTROL:
THE CONDENSER WATER FLOW CONTROL IS NOT MANAGED BY THE BAS SYSTEM. CHILLER CONTROLLER MUST COMMUNICATE DIRECTLY WITH EXTERNAL CONDENSER WATER CONTROL VALVE THAT IS ACTUATED BASED ON REFRIGERANT PRESSURE IN THE CIRCUIT MEASURED BY THE CHILLER. THIS VALVE MUST AUTOMATICALLY ADJUST CONDENSER WATER FLOW BASED ON REFRIGERANT PRESSURE.

THE CONDENSER SHALL HAVE A FLOW SWITCH WIRED DIRECTLY TO CHILLER. THE CHILLER MUST NOT BE ALLOWED TO START IF FLOW SWITCH DOES NOT INDICATE PROOF OF FLOW THROUGH THE CHILLER.

CONDENSER WATER FREEZE PROTECTION:
WHEN OUTSIDE AIR TEMPERATURE IS LESS THAN 45 DEG. F. (ADJ.), OPEN BYPASS 2-WAY CONTROL VALVE UNTIL OUTSIDE AIR TEMPERATURE IS GREATER THAN 45 DEG. F. (ADJ.)

EVAPORATOR WATER FLOW CONTROL:
THE CHILLED WATER FLOW MUST BE CONSTANT. EXISTING AND NEW 3-WAY ACU COIL CONTROL VALVES MUST MODULATE OPEN AND CLOSED IN RESPONSE TO ACU COMMAND FOR MORE OR LESS CHILLED WATER.

THE EVAPORATOR SHALL HAVE A FLOW SWITCH WIRED DIRECTLY TO CHILLER. THE CHILLER MUST NOT BE ALLOWED TO START IF FLOW SWITCH DOES NOT INDICATE PROOF OF FLOW THROUGH THE CHILLER.

CHILLED WATER PRESSURE/TEMPERATURE CONTROL:
THE CHILLED WATER SUPPLY TEMPERATURE MUST BE CONSTANT AT 43 DEG. F. (ADJ.)

THE MINIMUM SPEED ALLOWED BY THE CHILLED WATER PUMP MUST NOT PROVIDE LESS THAN THE MINIMUM REQUIRED FLOW THROUGH EITHER CHILLER, NOR MUST THE MINIMUM SPEED BE BELOW 30% OF PUMP DESIGN OPERATING SPEED.

MISCELLANEOUS MONITORING:
PUMP STATUS MUST BE MONITORED AT THE VFD AND BY THE DDC SYSTEM. VFD STATUS AND PUMP STATUS VIA DIFFERENTIAL PRESSURE TRANSDUCER IS REQUIRED.

CHILLER MONITORING POINTS SHALL BE PROVIDED FROM THE CCP.

EXISTING AIR HANDLING UNIT CONTROL VALVE:
EXISTING 3-WAY PNEUMATIC CONTROL VALVE FUNCTIONALITY TO REMAIN AS-IS.

NEW AIR HANDLING UNIT CONTROL VALVE: REFER TO M-703.

GENERAL NOTES

- REFER TO M-001 FOR MECHANICAL ABBREVIATIONS, LEGEND, SYMBOLS, AND GENERAL NOTES.
- REFER TO M-701 FOR CONTROLS ABBREVIATIONS, SYMBOL LEGEND, AND GENERAL NOTES.
- COMPONENTS SHOWN HALF-TONE ON THIS DRAWING ARE ITEMS TO REMAIN; BOLD COMPONENTS ARE NEW.
- REFER TO DETAIL F2 ON M-506 AND D5 ON M-504 FOR COMPLETE VALVE AND PIPELINE ACCESSORY DETAILS FOR NEW CHILLED WATER AND MAKEUP WATER SYSTEM COMPONENTS. CONTENT INCLUDED ON THIS DRAWING IS LIMITED TO ONLY THE PIPELINE ACCESSORIES THAT IMPACT SYSTEM FLOW.

KEYED NOTES

- INSTALL SELECT PIPING AND LINE-SIZE ISOLATION VALVES WITHIN FIRST SYSTEM SHUTDOWN AT BEGINNING OF CONSTRUCTION PROJECT. REFER TO M-002 AND M-413. WORK SHALL BE ACCOMPLISHED WITHOUT DRAINING FULL SYSTEM. FREEZING PIPE OR USING HOT TAP PIPE PLUG INSERTION SOLUTION IS ACCEPTABLE.
- CW MAKEUP WATER CONNECTION TO CHILLED SYSTEM IS MADE AT NEW AIR SEPARATOR 432SDE01-1, NOT SHOWN ON THIS DIAGRAM FOR SIMPLICITY.
- FUNCTIONALITY OF EXISTING PNEUMATIC CONTROL VALVE TO REMAIN AS-IS. EXISTING PNEUMATIC TUBING AND CENTRALIZED CONTROL COMPONENTS SERVING EXISTING VALVE TO REMAIN AS-IS.

Sheet Title
MECHANICAL CHILLED WATER FLOW DIAGRAM

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