

Element D Services

Heating, Ventilating, and Air
Conditioning

D306001 HVAC - Primary and Secondary Chilled Water

PART 1 - GENERAL

1.1 OVERVIEW

- A. This section includes control requirements for the primary and secondary chilled water system.

PART 2 - DESIGN CRITERIA

2.1 PRIMARY CHILLED WATER SYSTEM SEQUENCE

- A. The chilled water system will use chilled water supplied by the Central Plant. The chilled water system will be energized and controlled by the building automation system (BAS). Emergency power shall be available to power these pumps if they serve Patient Care facilities, Laboratory, or Vivarium facilities where air conditioned ventilation air is required. Refer also to Design Guideline Element D3000 for additional emergency power requirements.
- B. Pump Lead/Lag: The designation of the lead/lag pumps shall be adjustable. The BAS shall monitor the runtimes of all pumps and the pumps shall alternate to equalize equipment runtime every Wednesday at 9:30 am. The pump with the least runtime shall become the lead pump.
- C. The lead chilled water pump will be energized and its respective variable frequency drive will be ramped up if the differential pressure (DP) across TECO mains drops below 12 psig (adjustable) for longer than 30 minutes.
- D. After a five-minute (adjustable) time delay, if the lead chilled water pump cannot maintain the required DP (12 psig-adjustable) and chilled water pump speed exceeds 95 percent (adjustable), then the lag pump will be energized and its respective variable frequency drive will be ramped up. The speed of both primary pumps will be modulated by the BAS in unison to maintain the required DP (12 psig-adjustable) in the primary chilled water mains.
- E. When the chilled water pump speed drops below 60 percent (adjustable for a period of 30 minutes (adjustable)), the lag pump will be de-energized.
- F. Each chilled water heat exchanger shall have temperature sensors on the inlet and outlet of both primary and secondary sides. The primary side control valve shall modulate to maintain secondary chilled water temperature at 45 degrees F (adjustable).
- G. Dedicated temperature sensors (flow sensors provided by TECO) shall be installed on the primary chilled water main headers to monitor and measure consumption ton-hours and tonnage.
- H. If the TECO supply chilled water supply temperature is less than 44 degrees F (adjustable) and the secondary chilled water temp is less than setpoint + 2 (adjustable) for 60 minutes, primary pumps shall be turned off (pump bypass mode).

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- I. If the TECO supply temperature exceeds 44 degrees F for 15 minutes (adjustable) or the secondary chilled water temp exceeds setpoint +2 degrees F (adjustable) for 15 minutes, the lead primary pumps shall be turned on (pump mode).
- J. If the secondary chilled water temp exceeds setpoint +3 degrees F or greater (adjustable), immediately turn on the lead primary pumps (pump mode).
- K. Normal operating conditions shall be with the primary pump bypass mode. Cycle on each primary pump for 15 minutes each week.

2.2 SECONDARY CHILLED WATER SYSTEM SEQUENCE

- A. Pump Lead/Lag: The designation of the lead/lag pumps shall be adjustable. The BAS shall monitor the runtimes of all pumps and the pumps shall alternate to equalize equipment runtime every Wednesday at 9:30 am. The pump with the least runtime shall become the lead pump.. Emergency power shall be available to power these pumps if they serve Patient Care facilities, Laboratory, or Vivarium facilities where air conditioned ventilation air is required. Refer also to Design Guideline Element D3000 for additional emergency power requirements.
- B. The lead chilled water pump will be energized and its respective variable frequency drive will be ramped up on a call for cooling.
- C. After a five-minute (adjustable) time delay, if the lead chilled water pump cannot maintain the required DP (14 psig adjustable), and the chilled water pump speed exceeds 95 percent (adjustable), then the lag pump will be energized and its respective variable frequency drive will be ramped up. The speed of both secondary pumps will be modulated by the BAS in unison to maintain the required DP (14 psig-adjustable) in the secondary chilled water mains located at the top of the each riser.
- D. When lead and lag total chilled water pump speed drops below 40 percent (adjustable) for a period of 30 minutes (adjustable), the lag pump will be de-energized.
- E. Dedicated temperature and flow sensors shall be installed on the secondary chilled water main headers to monitor and measure consumption ton-hrs and tonnage.
- F. Specify water differential set point reset per ASHRAE 90.1 (latest state adopted version).

2.3 CHILLED WATER HEAT EXCHANGER CONTROL SEQUENCE

- A. The lead Heat Exchangers shall be enabled at all times. When the lead Heat Exchanger control valve is 80 percent open (adjustable) for 15 minutes (adjustable), the lag Heat Exchanger shall be enabled. Each Heat Exchanger shall modulate its associated control valve independently to maintain it's own CHW supply set point of 45 degrees F (adjustable). When both lead and lag control valves are less than 30 percent open (adjustable) for 60 minutes (adjustable), the lag Heat Exchanger shall be disabled.
- B. Heat Exchanger enable/disable: Isolation valve shall modulate fully open and control valve shall fully open and modulate to maintain Building CHW supply set point at 45 degrees F (adjustable). When the Heat Exchanger is disabled, the isolation valve shall modulate fully close and the control valve shall modulate fully closed. Each control valve shall have an end

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switch and position feedback to BAS.

- C. Heat Exchanger Lead/Lag: The designation of the lead/lag Heat Exchangers shall be adjustable and independent of pump lead/lag designation. The BAS shall monitor runtime of all Heat exchangers. Heat exchangers alternate to equalize equipment runtime every Wednesday at 10:00 a.m. The Heat Exchangers with the least runtime become the lead Heat Exchangers.

PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

3.1 GENERAL

- A. Not applicable.

PART 4 - PRODUCTS

4.1 GENERAL

- A. Refer to Owner's Master Construction Specifications. These are available on the Owner's Design Guidelines website:

<http://www2.mdanderson.org/depts/cpm/standards/specs.html>

PART 5 - DOCUMENT REVISION HISTORY

Issue	Date	Revision Description	Reviser
	20190301	Original Issuance	
Rev. 1			

END OF ELEMENT D306001