

# Element D Services

Heating, Ventilating, and Air  
Conditioning

## D306002 HVAC - Hot Water Systems

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### PART 1 - GENERAL

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#### 1.1 OVERVIEW

- A. This section includes control requirements for the hot water system.

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### PART 2 - DESIGN CRITERIA

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#### 2.1 HOT WATER PUMPS

- A. Hot water system pumps shall be controlled by the building automation system (BAS). 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 a.m. The pump with the least runtime become the lead pump..
- B. The lead hot water pump and its respective variable frequency drive shall operate continuously.
- C. After a five-minute (adjustable) time delay, if the DP cannot be met and total hot water demand exceeds 90 percent (adjustable) of the lead pump flow, the lag pump will be energized and its respective variable frequency drive will be ramped up. The speed of both hot water pumps will be modulated by the BAS in unison to maintain the required differential pressure (DP) (10 psi-adjustable) in the hot water mains located at the top of the main riser.
- D. When hot water demand drops below 60 percent (adjustable) of the capacity, based on flow, of the lead pump, for a period of ten minutes (adjustable), the lag pump will be de-energized.
- E. Hot water system demand (MMBtuh) and consumption (MMBtus) will be monitored by a flow measuring device and temperature sensors in the system supply and return mains.
- F. Provide hot water differential pressure setpoint reset per ASHRAE 90.1 (latest state adopted version).

#### 2.2 HOT WATER CONVERTER SEQUENCE

- A. All hot water system converters shall be controlled by the BAS to heat the heating hot water.
- B. The lead hot water converter shall operate continuously. The hot water converter's respective modulating control valve will be open fully when the converter is energized. Each control valve shall be provided with an end switch and position feedback to the BAS.

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- C. After a five-minute (adjustable) time delay, if the hot water demand, based on flow, exceeds 95 percent (adjustable) of the capacity of the lead hot water converter, then the lag hot water converter will be utilized.
- D. When hot water demand, based on flow drops below 80 percent (adjustable) of the capacity of the lead hot water converter for a period of ten minutes (adjustable), then the lag hot water converter will be de-energized.
- E. When hot water demand drops to 30 percent (adjustable) of the capacity, based on flow, of the lead pump, the pump speed will remain constant. Upon a further reduction of the hot water system flow, the hot water system minimum flow bypass valve at the farthest point of the piping system will be modulated open by the BAS to maintain system DP (adjustable). As an option to a bypass, an adequate quantity of three-way control valves at select coil locations may also be used to ensure minimum flow.
- F. A temperature sensor located in the hot water system supply main will, through the hot water control systems, maintain the hot water system leaving temperature. When the outdoor ambient temperature is 60 degrees F or above, the hot water system supply temperature set point will be 120 degrees F and when ambient temperature is 32 degrees F, or below, the hot water system supply water temperature set point will be 140 degrees F (setpoint will be higher if using non-condensing boilers). When the outdoor ambient temperature is between 32 degrees F and 60 degrees F the hot water system supply temperature set point will be reset inversely with change in outdoor ambient temperature.
- G. If the hot water is generated using steam from the TECO central plant or steam from a fire tube boiler. The steam system will have a steam control valve for each converter. These valves will be modulated as required to maintain the required hot water system supply water temperature. Each control valve shall have position feedback to the BAS.
- H. A pressure sensor in the steam line downstream of each steam control valve will, through the BAS, activate a trouble alarm at the operator's workstation if the steam pressure exceeds 60 psig.

### 2.3 CONDENSATE RETURN UNIT SEQUENCE

- A. Unit will consist, at a minimum, of a duplex pump with receiver tank and operating controls.
- B. The unit will be energized to run continuously via integral level controls. A high water level sensor will, through the BAS, activate a trouble alarm at the operator's workstation (MD Anderson Cancer Center Monitoring Services).

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## PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

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### 3.1 GENERAL

- A. Not applicable.

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### PART 4 - PRODUCTS

#### 4.1 GENERAL

- A. Refer to Master Construction Specifications.

### PART 5 - DOCUMENT REVISION HISTORY

Issue	Date	Revision Description	Reviser
	20190301	Original Issuance	
Rev. 1			

END OF ELEMENT D306002