

SECTION 22 34 00: DOMESTIC HOT WATER HEATERS

1. GENERAL

- A. Central natural gas-fired domestic hot water heaters and storage tanks are the preferred design choice, where natural gas is available
- B. In smaller facilities or locations where DHW is required in limited quantities, the use of central, gas-fired or electric storage tanks / heaters is acceptable.
- C. In larger facilities, the use of hot water (180F nominal) heated DHW storage tanks, served from a year-round building hot water heating system is also acceptable.
- D. For critical buildings, such as Research, Laboratory and larger Residence halls (over 100 beds), provide multiple water heaters and storage tanks to ensure system reliability. Review the need for redundant system components and system component sizing requirements during the project planning phase
- E. Refer to “Standard DHW System with Redundant Condensing Boilers,” sketch, attached at the end of this Section, for a typical large central DHW system configuration
- F. Commercial Storage Tanks
 - 1. Tanks shall have a minimum 5-year, non-prorated warranty
 - 2. Manufacturers:
 - PV
 - Lochinvar
 - AO Smith
- G. Circulating Pumps
 - 1. Manufacturer: Taco

2. GAS FIRED HEATERS

- A. In general, Brown prefers condensing-style natural gas-fired heaters for domestic hot water production. Fully condensing gas-fired water heaters shall have a minimum efficiency rating of 92%.
- B. For non-condensing gas-fired water heaters, the minimum efficiency shall not be less than 83%. Natural gas burners shall be capable of achieving modulation over its full firing range with a minimum natural gas input pressure of 5 inches water gauge
- C. For each heater, connect heater “enabled” control, heater run and alarm status points into the building BAS, as well as DHW system temperature monitoring points. Internal heater controls shall not utilize a BACNET interface to communicate with the BAS system
- D. Each individual gas fired water heater shall be rated at less than 1 MMBTU input, unless directed otherwise. Heaters whose input ratings are 1 MMBTU or more shall be fully connected, controlled, and remotely monitored by the campus-wide BAS system (see BAS Standard for specific requirements)
- E. Condensing-type heaters shall have a minimum ten year warranty on the heat exchanger and five years on the remainder of the unit. For non-condensing boilers, provide a minimum five year warranty on the entire unit

- F. Provide condensate neutralizing tanks, media and accessories for condensing water heaters
- G. Manufacturers:
 - Camus (DF Series),
 - Lochinvar (Knight or Sync Series)
 - Harsco (MACH Series)
 - RBI (Infinite Series)
 - AO Smith (Cyclone Series) or approved equal
- H. Flue material for condensing and near-condensing gas-fired water heaters shall be AL-29C

STANDARD DHW SYSTEM WITH REDUNDANT CONDENSING BOILERS

DHW SEQUENCE OF OPERATIONS

CONDENSING BOILERS WITH ALTERNATING LEAD/LAG SEQUENCE

- IF T1 < 140° SETPOINT (ADJUSTABLE), THEN ALTERNATING LEAD/LAG SEQUENCE FOR PUMPS P1 AND P2 SHALL BE ENABLED AND EITHER P1 OR P2 SHALL START. UPON VERIFICATION OF FLOW, THEN ASSOCIATED BOILER B1 OR B2 SHALL START. IF T1 DOES NOT REACH 140° WITHIN 5 MINUTES (ADJUSTABLE) OF LEAD/LAG ENABLEMENT, THEN SECOND BOILER B1 OR B2 SHALL START (ASSUMING 2 BOILERS).
- WHEN T1 REACHES 140° + DIFFERENTIAL, THEN P1, P2, B1, AND/OR B2 SHALL STOP.
- BOILERS B1 AND B2 SHALL HAVE ALTERNATING OPERATION TO EQUALIZE THEIR RUN TIMES.

DHW REDUCULATION SEQUENCE

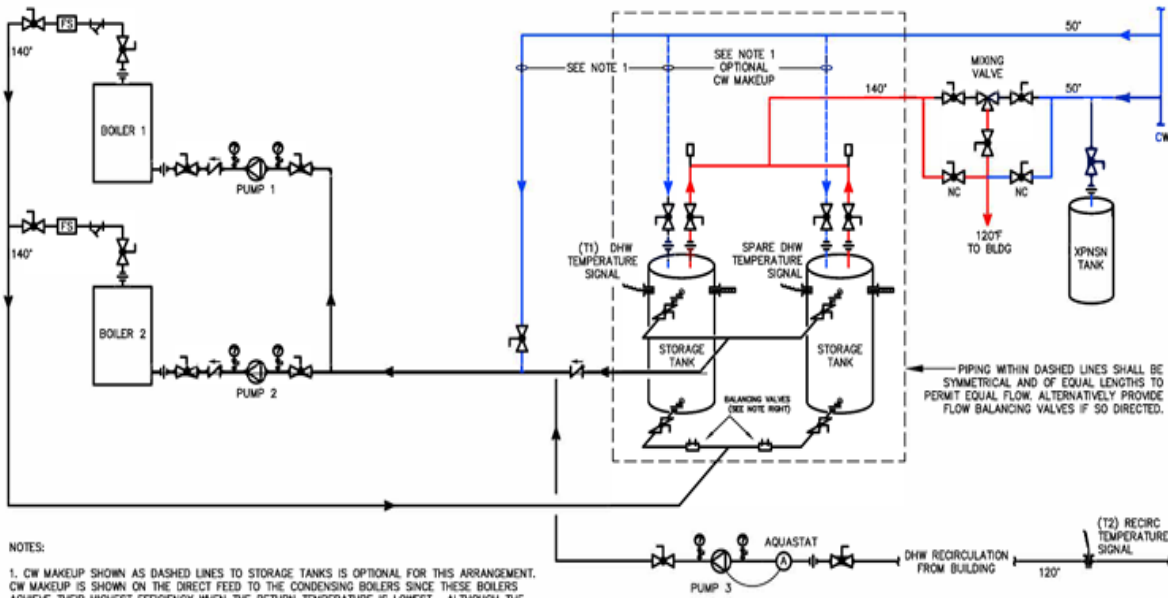
- WHEN AQUASTAT IS 95° OR BELOW (ADJUSTABLE), THEN PUMP P3 SHALL START AND SHALL RUN CONTINUOUSLY UNTIL AQUASTAT REACHES 120°. T2 MONITORS DHW RECIRC TEMPERATURE AND REPORTS TO BAS.

ALARMS

- BOILER B1 OR B2 GENERAL FAILURE ALARM.
- PUMPS P1, P2, AND P3 GENERAL FAILURE ALARM.
- H/L/O ALARMS FOR T1 SHALL BE 160°/100°F AND FOR T2 SHALL BE 140°/80°F.

LEGEND

- ↑ AIR VENT
- ⊞ BALANCING VALVE
- ⊞ BALL VALVE
- ⊞ CHECK VALVE
- || FLANGED CONNECTION
- FS FLOW SWITCH
- ⊞ GATE VALVE
- ⊞ PRESSURE GAUGE
- ⊞ PUMP
- ⊞ STRAINER
- ⊞ THERMOWELL, ANALOG
- ⊞ THERMOWELL, ELECTRONIC
- || UNION
- ⊞ VACUUM RELIEF



NOTES:

- CW MAKEUP SHOWN AS DASHED LINES TO STORAGE TANKS IS OPTIONAL FOR THIS ARRANGEMENT. CW MAKEUP IS SHOWN ON THE DIRECT FEED TO THE CONDENSING BOILERS SINCE THESE BOILERS ACHIEVE THEIR HIGHEST EFFICIENCY WHEN THE RETURN TEMPERATURE IS LOWEST. ALTHOUGH THE OPTIONAL DASHED CW MAKEUP CAN BE PROVIDED, IF LEFT OPERATIONAL IT WOULD NOT ALLOW THE CONDENSING BOILERS TO ACHIEVE THEIR HIGHEST EFFICIENCY SINCE IT WOULD DILUTE THE WATER TEMPERATURE IN THE TANKS BEFORE BEING RETURNED TO THE BOILERS.
- NOT ALL BOILER, PUMP, AND TANK TRIM IS SHOWN. NOT ALL CONTROL DEVICES ARE SHOWN.