1. Pressure gauge with snubber. Install with mounting on wall or stand. Install flexible copper tubing to piping connections to avoid vibration damage to the gauge. Preferred connection locations are:
   (1) just upstream of strainer.
   (2) Gauge tapping on pump inlet flange.
   (3) Gauge tapping on pump outlet flange.

2. Size per bladder tank manufacturer's recommendations but not smaller than connection to tank.

3. Provide anti-thermosiphon loop to prevent gravity heating of tank. 12" minimum drop.


5. 3/4" ow make-up water piping to heating water system. Provide 3/4" normally closed threaded ball valve with hose adapter & cap. Route connection point to a point no higher than five feet (5) A.F.F. in mechanical room.

6. H.C. shall coordinate and verify initial tank charge with university fill system.

7. When closed loop system is constructed of black steel piping, all threaded nipple/siping between each point of connection to closed loop system & first isolation valve shall be schedule 80 for increased rigidity & corrosion life.

---

**FLOW DIAGRAM - HOT WATER HEATING SYSTEM**

XX

HWS & HWR piping for potential future installation of side stream filter.

Heat exchanger

Drain piping shall be same size as outlet connection on air separator. Provide ball valve with hose adapter & cap.

Manual air vent. Install at high point of anti-thermosiphon loop.

Pipe to drain (Typ.)

System drain with 3/4" full port ball valve, hose adapter and cap.

Nominal 4" concrete pad by H.C. (Typ.)

Air charged replaceable bladder type expansion tank.

4" thick reinforced concrete housekeeping pad.

Flow meter (Typ.)

Thermometer (Typ.)

Temperature sensor (Typ.)

Locked open shut-off valve

Connect to side of main (not top or bottom) to avoid air or dirt entering piping.

Manual air vent. Install at all high points of system. Pipe to an accessible area. (Typ.)

Air separator. Same size as piping.

Pipe size to match connection size.

High capacity automatic air vent. Pipe discharge to drain.

3/4" vacuum breaker with less than 15" H2O opening vacuum. Johnson VB-8 or equivalent. Verify connection size with manufacturer.

Refer to steam and condensate flow diagram.

Refer to steam and condensate flow diagram.