SECTION 22000

Hot Water Heaters (Hot Water Recirculation Systems and Point-of-Use Water Heaters)

PART I - GENERAL

A. Description

This section includes requirements for materials for installation of Hot Water Recirculation Systems and Point-of-Use Water Heaters.

B. Submittals

1. Provide materials list showing materials utilized.
2. Provide Certificates of Compliance with all applicable Uniform Plumbing Code and California Building Code standards.

C. Application

There shall be a recirculation system or a water heater located within 10 linear pipe feet of every hot water fixture. Only Hot Water Recirculation System or Point -of-Use Water Heater designs that meet the requirements of this section shall be installed.

PART 2 – HOT WATER RECIRCULATION SYSTEMS

A. Materials

Demand Controlled Recirculation Systems

1. Pump
   a. On-demand pump sized to move the water between 5 and 8 gpm in the recirculation loop.
   b. Pump shall be installed with unions and manual isolation valves on inlet and outlet to facilitate repair and replacement

2. Controls and Activation Mechanisms
   a. Hard wired

i. Button located in a switch plate in close proximity to hot water fixtures to activate the recirculation pump.

ii. Motion Sensor located to trigger the recirculation pump when someone gets near the hot water fixture.

b. Wireless (remote control)
   i. Button. Give these to the homeowner so that they can put them where convenient. Possible locations include near the kitchen sink, at the head of the bed in the master bedroom, in the laundry room, on the mirror in the guest bathroom to trigger the recirculation pump.
   ii. Motion Sensor located to trigger the recirculation pump when someone gets near the hot water fixture.
c. Provide one activation mechanism for each hot water location, show location on plans. Provide an explanation if less than one activation mechanism per location is needed.

3. Acceptable manufactures of Demand Controlled Recirculation Systems shall be ACT Inc, Metlund Systems, Taco, or Wirsbo or equivalent.

<u>Time and Temperature Controlled Recirculation Systems</u>

1. The recirculation ump shall be installed with unions and manual isolation valves on inlet and outlet to facilitate repair and replacement
2. Controls and Activation Mechanisms
   a. System shall be equipped with a 24-hour timer which will automatically turn the pump "off" and "on" at preset times. The timer shall be set to run no more than 10 minutes every hour.
   b. System shall be equipped with a thermostatic control (aquastat). The aquastat shall turn the pump off when the temperature of the water in the return line has reached the upper limit of the aquastat and turn the pump on when the temperature of the water in the return line has reached the lower limit of the aquastat. The upper limit shall be no more than 115F and the lower limit shall be no lower than 105F. Preferably, the aquastat should be located immediately after the furthest branch line from the water heater.
3. Acceptable manufactures of Time and Temperature Controlled Recirculation Systems shall be Grundfos, Taco or Laing or equivalent.

B. Execution – Hot Water Recirculation System

1. Pumps – install pumps, controls and activation mechanisms in accordance with applicable codes and manufacturer's instructions.
2. Recirculation Loop
   a. System shall have a dedicated hot water recirculation return line that returns water to the hot water heater. The return line shall preferably be connected to the water heater drain outlet.

b. A check valve shall be installed as close to the water heater as possible in the recirculation loop to prevent unintentional circulation. This check valve may be included at the pump.
c. The recirculation loop shall be sized in accordance with the UPC. The recirculation loop shall have a minimum diameter of ¾ inch nominal anywhere in the loop including the return from the last fixture to the water heater.
d. All hot water fixtures must be within 10 lineal feet of the recirculation loop.
e. Keep the equivalent length of the recirculation loop to a minimum by minimizing the number of fittings.
    i. Copper and CPVC
        1. Elbows – minimize to the extent practical the number of hard 90 degree elbows since these have a major impact on the equivalent feet and increase the resistance that the pump must overcome. Use manufactured wide sweeping elbows or bendable copper. Preferred radius is 8-12 times pipe diameter.
        2. Couplings – minimize the number.
        3. Tees – required for branch lines
    ii. Cross-linked Polyethylene (PEX)
        1. Elbows – minimize the number to the extent practical of hard 90 degree elbows since these have a major impact on the equivalent feet and increase the resistance that the pump must overcome. Use the tubing's flexibility to make the bends. Follow manufacturer's instructions for minimum radius on all bends.
        2. Couplings – minimize their use since they also increase the equivalent feet and resistance. In general, make the joints at the tees for the branches.
        3. Tees – required for branch lines

3. Branch Lines (lines that run from the recirculation loop to the fixture)
    a. Branch lines shall be the shortest possible length from the recirculation loop to the fixture with a maximum distance of 10 feet. Exceptions may be requested for island sinks, tubs (not tub-shower combos) and washing machines, and must be approved by the District.
    b. Select the diameter of the branch lines in accordance with the UPC, in general ½" or less. Exceptions must be approved by the district engineer or his/her representative.
    c. Each fixture should be served with its own branch line. Example exceptions include: a branch line serving two sinks so that the total distance from the water heater to each sink is less than 10 plumbing feet, or a water heater serving a sink and a shower or tub/shower combo. Exceptions must be approved.
    d. Minimize the number of fittings in the branch lines to the extent practical, particularly hard elbows.
4. Insulation
    a. The entire recirculation loop and all branch lines must be insulated.

b. Minimum R-4 pipe insulation shall be used per Title 24 of the California Code of Regulations.
c. Install in accordance with manufacturer's specifications.

5. Commissioning the system
   a. Purge all pipes before installing the pump to remove air and other unwanted materials.
   b. Get the water heater(s) up to the desired temperature in accordance with the water heater manufacturer's instructions.
   c. Follow the manufacturer's instructions applicable to each pump, controls and activation mechanisms to ensure that the system is operating correctly.
   d. Preheat the recirculation loop to check for proper operation.
   e. Verify that less than two cups of cool water come out of each fixture before hot water arrives at that fixture.
6. Customer Education
   a. Provide the homeowner with all warranty and operational material supplied by the manufacturer. This information must include what to do in the event of a water or electricity outage. This information should advise the customer how and when the system should be turned off to prevent damage.
   b. Demand Controlled Recirculation Systems
      i. Provide stickers for each switch plate and remote button that say "Press before you want hot water"
   c. Time and Temperature Controlled Recirculation Systems
      i. Provide stickers that tell how to adjust the timer and controls.

C. Warranties

1. All hot water recirculation systems shall have a minimum of a two year guarantee from the date of manufacture.

PART 3 – POINT OF USE WATER HEATERS

A. Materials

1. Point-of-Use Water Heaters
   a. Select water heaters sized for the load based on the fixtures served.
   b. Water heaters may be tank or tankless.
   c. Water heaters should be installed with isolation valves and unions to facilitate maintenance.
   d. Install in accordance with applicable codes and manufacturer's instructions.

B. Execution

1. Piping
   a. Install the shortest possible length of pipe between the water heater and fixture(s) with a maximum distance of 10 feet. Exceptions may be requested

for island sinks, tubs (not tub-shower combos) and washing machines, and must be approved.

b. Each fixture shall be served with its own branch line. Example exceptions include: a branch line serving two sinks so that the total distance from the water heater to each sink is less than 10 plumbing feet, or a water heater serving a sink and a shower or tub/shower combo. Exceptions must be approved.
c. Select the diameter of the branch lines in accordance with the plumbing code, in general ½ or less. Exceptions must be approved by the District.
d. Minimize the number of fittings in the branch lines, particularly hard elbows.

2. Insulation
   a. All hot water piping must be insulated.
   b. Minimum R-4 pipe insulation shall be used per Title 24 of the California Code of Regulations.
   c. Install in accordance with manufacturer's specifications.
3. Commissioning the water heaters
   a. Follow the manufacturer's instructions applicable to each water heater to ensure that it is operating correctly.
4. Customer Education
   a. Provide homeowner with all warranty and operational material supplied by the manufacturer of each water heater.

End of Section