Residential Hot Water Return Circulation Systems

Residential hot water return circulating systems are systems that circulate hot water through the copper piping so that hot water is nearly instantaneous at the point of use. Large commercial buildings, such as hotels, have been doing this for years. With the advent of larger square footage homes, and more hot water usage points in a home, there may be a requirement to include a hot water return circulation in a family residence.

Circulating systems provide convenience and may save water and fuel costs. For example, do you have to turn on the shower and then wait for a minute before the water is warm enough to use? The cold water you have purged from the system goes down the drain; the hot water you've paid to heat that is in the pipes will soon cool off and become unusable. The greatest efficiency is obtained when the plumbing is designed for the hot water circulating system to deliver hot water immediately at the point of use. However, in many cases, a homeowner has decided to add the circulating system to an existing plumbing system. This is most common with renovations and 'add-on' construction.

How does it work?

For homes that do not have circulating systems, the basic idea is to install a return line from the point of demand to the water heater. This return line is used to 'circulate', hence the term return circulation, the hot water from the desired fixture back to the water heater. This ensures there is hot water instantly available at the faucet that it is required.

The hot water is returned to the water heater and re-enters the heater at the cold-water inlet. The add on type systems use the cold water line as the return line for the hot water circulation loop. In these systems, the pump may be located under the fixture where the immediate hot water is desired or at the water heater itself. If placed at the farthest hot water faucet from the water heater, then most of the faucets in between will deliver hot water faster.

The most common types of hot water circulating systems include systems that:

- Continuously circulate hot water
- Systems that circulate the hot water based on a timer or temperature
- Demand type circulation

A continuous circulating system has a small, fractional horsepower pump that is on all the time. It circulates the hot water from the return point back to the water heater. This method is the most wasteful in terms of energy costs to keep the water hot.

Another circulating system uses a temperature control to turn a pump off and on. These systems use temperature set points (a turn on temperature and a turn off temperature) that are lower than the thermostat setting on the water heater. Although the hot water is not really hot

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right away, just warm, hot water arrives much more quickly than with a typical plumbing system.

The demand style of circulating system incorporates a switch or other device to turn on the pump when hot water is desired. The pump may be strong enough to pump the water from the water heater to the point of use at a much faster rate than it normally flows from the tap. This gets the hot water to the fixtures more rapidly than running the faucet and keeps the water in the system instead of going down the drain. The pump normally runs for a few seconds because of a timer each time hot water is desired. The energy used by the pump is minute, typically less than a few of dollars a year.

To further conserve electrical and gas fuel costs, both the demand type system and the temperature control type systems can be used with timers. The timers can be set to run at high demand periods of the day, say in the morning before work and school – and again after dinner when it is time for showers, so that hot water can be obtained quickly at these peak hour times.

A typical example of a return circulation in a home may look like this:

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