



Can Recirculation Systems Conserve Energy?

The US Department of Energy estimates that more than 400 billion gallons of water are wasted nationally from people waiting for hot water to arrive at the fixture. Hot water recirculation systems solve this problem by bringing hot water closer to the point of use.

There's just one problem: many recirculation systems run all day, every day, which wastes pumping and heating energy. A setback allowing a 10 degree temperature drop in the circulation pipes during unoccupied times can reduce standby losses in the system by as much as 25%.

This Smart Tip describes how the Illinois Energy Code addresses this subject.

Hot Water Recirculation Requirements in the 2018 IECC

Requirements:

Two system types:

Demand Recirculation Systems use the cold water line to return water to the heater. The pump must start upon receiving a signal from the action of a user or sensing flow to a fixture. Also, water entering the cold water line must be no more than 104 ° F. **See C404.7 and R403.5.2**

Circulation systems usually have a dedicated return line and are more common in large buildings. The Code specifies that these system start based on demand for hot water. The controls must automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is not a draw of hot water in the building. **See C404.6.1 and R403.5.2**

Implementation:

Different controls strategies:

For **Demand Recirculation Systems** controls include occupancy sensors, user operated low voltage switches and other user initiated inputs. Commonly for these systems, the pump is located under the sink that is furthest from the water heater.

In **Circulation Systems**, a flow sensor is required on the cold water inlet of the water heater. This would signal the pump when to operate based on fixture use. Also, a temperature sensor must be located at the end of the hot water loop to notify the system when the target temperature has been met. A flow sensor on the hot water line cannot be used since recirculation would look the same as demand.

What about Legionella?

There is a risk of legionella bacteria in hot water systems, but the 2018 IECC rules take this into consideration. The return water temperature sensor at the end of the loop also ensures a safe *minimum* temperature is maintained. Further, properly insulated pipes per IECC rules ensure good contact time for effective bacteria kill. **You don't have to sacrifice safety for an energy efficient hot water system!**

WHO WE ARE

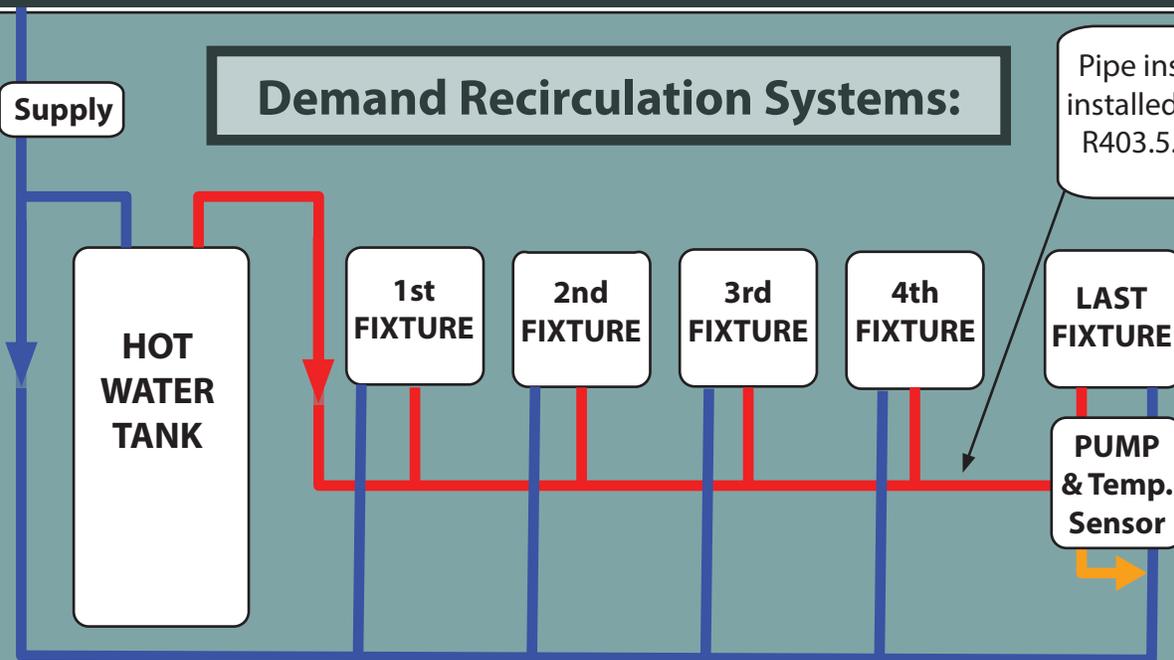
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Hot Water Recirculation System Types in the 2018 IECC

Demand Recirculation Systems:



Pipe insulation must be installed per C403.11.3 or R403.5.3, as applicable.

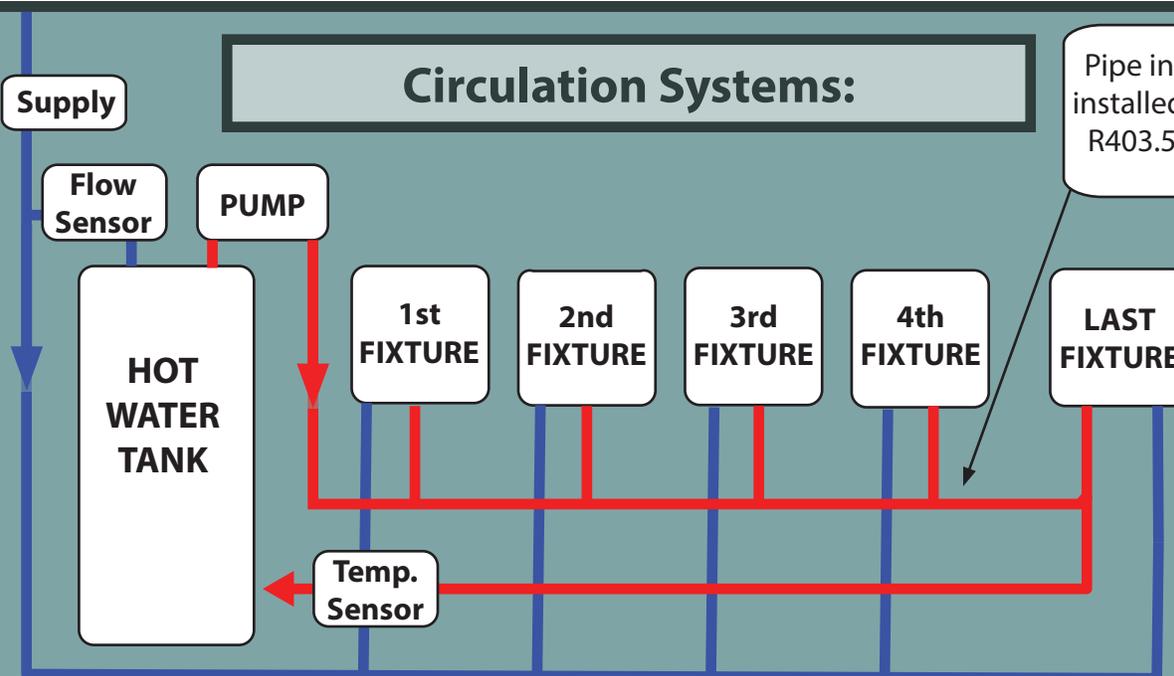
Characteristics:

- Cold water line returns warm water to the water heater
- Most common for smaller buildings
- Appropriate for a retrofit
- Lowest install cost
- Pump usually by farthest fixture

IECC Requirements for Demand Recirculation Systems (IECC C404.7 and R403.5.2):

- Return water can't be more than 104 ° F
- The pump must be switched on due to one of the following:
 1. An action by a user
 2. Sensing the presence of a user
 3. Sensing flow to a fixture or appliance

Circulation Systems:



Pipe insulation must be installed per C403.11.3 or R403.5.3, as applicable.

Characteristics:

- Usually a dedicated line returns hot water to the water heater
- Most common for larger buildings
- Higher install cost
- Pump traditionally located near the water heater

IECC Requirements for Circulation Systems (IECC C404.6.1 and R403.5.2):

- The pump must be switched on based on demand for hot water in the building
- The pump must switch off based on the target temperature and no demand for hot water