PATH Technology Inventory

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Drainwater Heat Recovery

Summary

Drainwater heat recovery (DHR) devices fit into existing waste drain lines from showers and bathtubs to capture heat from the drainwater to preheat cold water going to other showers or a water heater. DHR systems reduce the energy needed to heat water and increase the capacity of water heaters.

Courtesy of WaterFilm Energy, Inc. Click to view larger images

Details

Heat exchangers for use in drainwater heat recovery (DHR) may vary in terms of pipe sizing, orientation of the drain line (horizontal, vertical, or other), and heat exchange design. They will also vary in cost and amount of possible energy savings.

There are several residential drainwater heat exchangers commercially available in the U.S. They generally have the ability to store recovered heat for later use. Units with storage capacity can also recover heat from hot water uses such as dishwashers and clothes washers. Without storage capacity, DHR units provide useful energy only during simultaneous flow of cold supply and warm drain water (for example, during

showering).

Some DHR systems are storage-type units that have a tank containing a reservoir of clean water. Drainwater flows through a spiral tube at the bottom of the heat storage tank, and tank water warms and rises to the top. Water heater intake water is preheated by circulation through a coil in the top of the tank. The system is designed so it does not lose stored heat to cold wastewater.

Other systems are non-storage units that have a copper heat exchanger that replaces a vertical section of a main waste drain. As warm water flows down the waste drain, incoming cold supply water flows through a spiral copper tube wrapped tightly around the copper section of waste drain. Heat is picked up by the cold supply water and is sent to the cold side of the fixtures (i.e. shower) or to the water heater.

Some non-storage units exchange heat between the drain pipe and the incoming cold water supply line by a horizontal heat exchange device that thermally connects the drain pipe and the cold water supply tube.

Installation

Most DHR systems are installed in the main waste drain of the house by an experienced plumber. Depending on the system, it is placed vertically or horizontally in the main waste drain. All DHR units can be used for retrofit or new construction. However, installation will usually be less expensive in new home construction.

Benefits/Costs

DHR can save energy and increase the capacity of undersized water heaters. Available systems can vary in cost between $95 and several hundred dollars, depending on type and capacity.

Limitations

Energy savings will vary considerably, depending on location of waste drain pipes, water heaters, bathrooms, and number and lifestyle of occupants. Many plumbers are not familiar with DHR installation. However, most systems use common equipment and tools, and installation is relatively simple.

Code/Regulatory

DHR units described above are double-walled heat exchangers that meet most local plumbing codes for potable water. Double-walled heat exchangers are covered by the Uniform Plumbing Code, Section 603.3.4; 1995 CABO (Council of American Building Officials) One and Two Family Dwelling Code, Section 3402.3.1; 1998 ICC (International Code Council) One and Two Family Dwelling Code, Section 3402.4.2.1; and 2000 ICC International Residential Code, Section P2902.4.2 - Heat Exchangers.

Availability

DHR devices are commercially available.

Contact(s)

Do you have a specific question about this technology and/or its 'real life' applications? Try the contacts listed below:

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