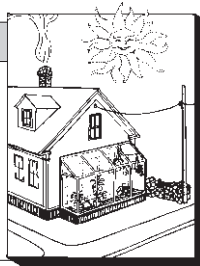


Instant Hot Water—Maybe

by Alex Wilson



Demand or instantaneous water heaters have been widely used in Europe for several decades and have been available in this country for ten years. They have been extensively promoted through advertising campaigns, magazine articles, and building trade shows. Demand water heaters only heat water as it is used, so there are no stand-by losses—the primary culprit of low efficiency in conventional water heaters.

Yet demand water heaters have failed to achieve a significant market share in the U.S. In fact after numerous calls to progressive builders in my region, I was unable to find a single builder who regularly (or even occasionally) installs them into homes. Why?

Counter-intuitive techniques had to be learned to regulate water temperature. It took practice, and guests were often in for a big surprise.

Drawbacks

There are two significant drawbacks to demand water heaters: in early models, the inability to regulate temperature output, and the limited flow rate achievable. When demand water heaters first appeared, they operated on two modes: on or off. When on, they delivered their full 90,000 Btus per hour to the water flowing through them. How hot the water got depended on how quickly it was pushed through the heat exchanger. This created some real problems for the user. Counter-intuitive techniques had to be learned to regulate water temperature. Properly regulating shower temperature took practice, and guests were often in for a big surprise!

Fortunately, this drawback has been corrected and most demand water heaters, incorporate modulating gas flame (or thermostatically-controlled electric input). The modulating flame allows the same temperature output at different flow rates and different inlet temperatures. If considering a demand water heater, *make sure it has a modulating flame*. Difficulty in use of the non-modulating flame units gave demand water heaters somewhat of a bad name—and they have never fully recovered.

The other drawback to demand water heaters is the output. The largest gas-fired demand water heaters provide about 90,000 Btus per hour output, enough to raise water temperature by 90 to 100°F at two gallons per minute (GPM) flow rate, about 60°F at three GPM, and 45°F at four GPM. With 50°F inlet temperature and a shower at 110°F, this means you only get a maximum of about two GPM for your shower flow

rate. A standard full-force shower uses about double that (four GPM).

Therefore low-flow shower heads, which use only one to one and one-half GPM, and water-conserving faucets are clearly a necessity.

If you want to have two showers operating at the same time, or one shower and another major hot water user (clothes washer or dishwasher, for example), then limitations become obvious. Lower output gas-fired or electric demand water heaters restrict hot water use even more. You might as well forget it if you want to fill a 30-gallon Jacuzzi!

Electric demand water heaters are typically smaller in size and heat output than gas-fired models. The largest electric model I could find uses 18 kW at 240 volts (75 amps!) to produce a maximum of 61,000 Btus per hour or a 60°F temperature rise at two GPM flow. Though the heaters themselves are not that expensive,

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putting in 75 amp 240 volt service can run into considerable wiring costs. In addition, if we ever get into residential demand charges from the utility company (as we undoubtedly would if everybody started putting in electric demand water heaters), the user would end up with a big surcharge on his utility bill with an intermittent 18 kw usage.

Demand Heaters for Space Heating

For specialized space heating applications, demand water heaters are quite well received by users. Of those builders I spoke with who were enthusiastic about demand water heaters, all used them for space heating as the principal application, not domestic hot water. Matthew Friedlander of Thermal Options, Inc. of Brattleboro, Vt., and Len Meserve of Nature's Way in Keene, N.H., both use them for charging radiant floor heating systems.

Meserve installs quite a few combination systems, using demand water heaters for both space and water heating, but he gets the hot water indirectly. The demand water heater heats water in an insulated storage tank via a heat exchanger rather than heating the potable water directly as it is used. This is the same principal used in boiler-coupled storage-type water heaters.

As many builders of very energy-efficient houses know, finding a

conventional boiler with a low enough Btu output can be difficult. For space heating (and water heating with the heat exchanger), demand water heaters serve as very effective low output boilers. Increasingly, demand water heaters are filling this niche. In fact, as this trend continues, there will be less and less distinction between demand water heaters and boilers.

As for the standard application of demand water heaters—heating water as it is used—the message I received from most builders and plumbing contractors is that you will probably do better with something else. ■

Alex Wilson is a technical writer based in Brattleboro, Vermont who specializes in energy and building issues.