The Inspector's Corner:
Instant-on Water Heaters

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In the last several weeks I have had several clients and realtors ask about tank-less or instant-on water heaters. The manufacturers of tank-less water heaters promote the efficiency and the fact that you will never run out of hot water. Sound like a great idea especially when you have several teenagers and everyone is trying to shower in the morning. However when you look at the limitations and economics of these systems your opinion may change.

The tank-less water heaters come in many different sizes. These heaters have a voracious appetite for natural gas or electricity, often two or three times the amount of a standard residential water heater. If you need one to supply an entire family with hot water, look for one that has an input of no less than 165,000 Btu. If you want to supply a large home you will need a model with a burner that consumes an astonishing 230,000 Btu of gas per hour. To put this in comparison, a forced hot air heater for a large home is typically 100,000 BTU.

Even with an enormous gas burner, the tank-less water heaters have limitations. The key is the flow rates. This number tells you how much water a tank-less heater can deliver at a given temperature rise. The flow rate in your home is a function of how many fixtures are demanding hot water. As more hot water faucets are turned on at the same time, more water flows through the heater. When this happens water may exit the heater before it gets to the desired temperature. Another factor is the temperature of the incoming water. If you live in a cold climate as we do, the temperature of the water can vary drastically from summer to winter. Here in the Front Range, it is common for the incoming cold-water temperature to be 45F or so in the middle of winter. Water at this temperature pushes a tank-less water heater to its limit in a typical residential setting. A typical tank-less heater with a 165,000 Btu burner can raise the water temperature to 110F and deliver 3.8 gallons per minute of this heated water indefinitely.

However, even this big unit can barely support two demands for water at a time. A code approved typical shower faucet will deliver 2.5 gallons of water per minute (actually most people remove the restrictor and then its 4 gallons per minute). A typical kitchen sink faucet will discharge 2.0 gallons of water per minute. Do the math and you can see that these two common fixtures have exceeded the capacity of the tank-less heater. It takes the same amount of energy input to heat water no matter what type of device you use. Ask any engineer and she/he will tell you that you must expend one Btu of energy to raise one pound of water one degree Fahrenheit. This simply means that a tank-less heater and a

traditional storage tank heater must each burn the same amount of energy to heat the water in your home. But, each heater has a different efficiency rating. The tank-less heaters are more efficient, but not as efficient as you might think.

The cost issue is even more dramatic. The tank-less heaters are expensive. A large whole house model typically costs $1,000.00. A traditional storage tank water heater that has a super-fast recovery time costs less than $500.00.

But the cost issue does not end there. The tanks less heater manufacturers often claim all sorts of energy savings when you switch to their products. However when you factor the extra cost at the time of purchase versus the annual saving you will see the breakeven point is years away. People tend to forget that they don't save any money until they pass the breakeven point. In other words, if you pay $500.00 more for a tank-less heater and you first must get back the extra money you spent. It could take you years and years to achieve the breakeven point.

However there applications that tank-less water heater are appropriate such as cabins or condos that are not occupied full time. Other applications in Colorado would be outbuildings or large ranch style homes that have bathrooms far from the existing water heater. However, there is no way a tank-less water heater could keep up with my family or the families I know. The only way I see a tank-less heater working is to get the largest one available or multiple units, which skews the economics so dramatically that you may never hit your breakeven point.

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