Field Experience with Tankless Hot Water Heaters Used in Combination Space and Domestic Hot Water Heating Systems

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For: ACEEE/DOE Hot Water Heating Forum
San Francisco, CA
May 12, 2011

Notes:
1) Thermostatic on electric water heater tank is wired to energize the Taco 015 sequence rather than the reservoir element. 2) Thermostat breaker is 55°FHP and is capable of 5 amp at 180°F, which is the design pressure drop recommended by RI/MA after purging through the tankless water heater.
3) Electric water heater storage tank is available from Valsir in L700, with all the ports necessary. The tankless water heater installation is for the same valves and pressure/temperature relief ports. The space heating coil loop size the available valves ports.
4) This configuration will have the most regulated heat control at the Domestic Duties, compared to the passive storage system to the system without storage. This system will also have the heat short-cycling of the tankless water heater.
Dried mineral precipitate from inlet strainer
$50 solution failed

Mineral precipitate and crystals collected on Shelco 230 micron strainer, after about one year. Would have clogged the Rinnai strainer many, many times.
Combi system with non-condensing gas-fired tankless heater
(PA installation with water conditioner added)
Scale removed from galvanized dielectric union fittings weeks after installation of electronic water conditioner.

Combi system with condensing gas-fired tankless heater (Installed in NYSERDA Utica, NY project in Fall 2010).

Combination space and domestic hot water heating system with tankless gas water heater and small storage/manifold tank. Installed at NYSERDA deep energy retrofit project in a 2-family building in Utica, NY.

Rinnai 045 AHB Hydronic Air Handler (ECM fan)
Cost (sealed bid)

Group [A] Heating system
Labor: $1,728 plus Materials: $5,000

Group [A]
2 Rinnai RC 80 H.P.I  O.D.H.
2 plumbing kits
2 termination kits for Rinnai
2 10” vent extensions (polypropylene)
2 whirlpool 12 gallon hot water tanks
2 Therm-x-trol St-5 expansion tanks
2 mixing valves
2 clearwave H.D. electronic water conditioners
2 Y strainers- Watts 351 M (stainless steel)
2 taco Brass 007 Pumps
2 Taco S.S. 013 Pumps
2 Rinnai 045 AHB Hydronic Air Handler
4 Flow check Valves
2 ½” Drain valves
14 ¾ “ ball valves
2 Lex Pro 511 C T-Stat
All copper tubing and fittings to complete install
All electrical wire and boxes, switches, breakers

Same operational problems with inlet strainer clogging, plus more!

Combi system with condensing gas-fired tankless heater,
Small storage tank removed
(modified in NYSERDA Utica, NY project in Winter 2011)

Hot water consumption was higher for System 1 (no tank)
Water heater daily runtime was similar for both systems.

Water heater cycles per day was much higher without the tank.

System without tank has wide range of supply air temperature.

System with tank has narrow range of supply air temperature.
System 1 (no tank)
Temperature leaving mixing valve vs. Draw rate

System 2 (tank)
Temperature leaving mixing valve vs. Draw rate

System without tank provides room temperature water at low draw rates

System with tank provides consistent hot water even at low draw rates
System 1 (no tank)
various draw patterns and heater response

System 2 (with tank)
Daily electrical consumption for tankless heater plus circulator

System 2 (with tank)
Daily electrical consumption correlates to water heater runtime not space heating runtime

Thank you!

Questions?