



Before



After

Pictures and 'A Thousand Words' What a \$200,000 Residential HVAC Project Looks Like

By Career-Tradesman, John W. Rocheleau

While eating breakfast at The Golden Egg in Rye, I had a chance encounter with a patron that led to the best HVAC job (that included the installation of my new inventions) of my 33-year career. After brief conversation, I realized that a "golden" sales opportunity was falling right into my lap and agreed to check out his "HVAC project".

I arrived at his residence and did a walk-through of the expansive seaside home – 6,700 square feet. A bid on par with his systems needs would mean immense "drawing board" time on my part, something most HVAC contractors willfully do for free.

It would take at least 60 hours of time to create the designs, estimates and proposals necessary to pull off successfully completed installations, so I said I would create the plans for guaranteed-to-work systems for \$1,800 down and \$1,800 at delivery.

I told him he could shop the designs around for the best price if he wanted. I even offered to work as a consultant to ferret out a lower-price contractor to do the job, and review the designs with him, and to make progress/finish inspections of the work to ensure the project was completed according to the designs and specifications I created. I also said I would refund his \$3,600 if he hired me. He agreed.

A week later, finished designs, estimates and proposals in hand, I showed how the designs would incorporate my proposed systems with his space. He was convinced that I was the right guy for the job when I shared all of my numbers with him, including mark-ups and margins. He said two words, "You're hired!"

I started the job in April of 2010 and finished in January of 2011. While the original proposal amounts were for about \$148,000, the scope of the job increased and the price resolved to just over \$200,000.

Robert Fitzmaurice

Date: May 7, 2014

Subject: John Rocheleau is the best in his field.

See attachment: "Pictures and A Thousand Words" pdf presentation.

The back story is as follows: I bought my house in 2009. The house was renovated and expanded to 6,700sf by the previous owner around 1998. The house's footprint is, let's say, complex. The systems to heat, cool, vent, etc, while relatively new, were monstrous, messy, and inefficient.

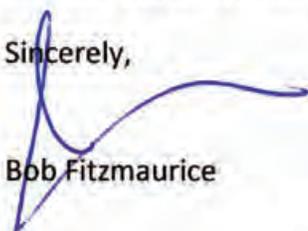
On one of several emergency repair calls during my first year of ownership; an employee of the original installer quipped, "I used to live here", referring to his regular visits to this house to address problems with the systems. Several HVAC service providers later, I decided to pursue a complete systems replacement.

After investing about an hour each with representatives from several companies, I received quotes which ranged from \$35,000 to \$140,000... How could this be?? Some presentations were housed in polished 3 ring binders (which mostly contained boiler plate wording and manufacturer brochures), while others were just two pieces of paper with a price estimate at the bottom. How can anyone agree to such a large investment without a detailed plan, time line, and cost break down? I would not, and therefore did not, until I accidentally met John Rocheleau.

John explained a process that made sense to me. It would start with me retaining him to create designs for a modest fee to cover his extensive time. I gave him the same one hour tour and overview as I did with the others. John returned, several times in fact, to conduct his detailed evaluation and analysis to support his designs. John's process was a significant investment of his time and a great investment for me. The several discussions we had along the way helped shape a plan that I had confidence in. Then John set out to price the job in great, albeit intelligently organized detail.

The rest of the story is best told in John's, "Pictures and A Thousand Words" pdf presentation. My bottom line is that John's brains, process, and striving toward perfection in carrying out the work became a solid investment in both my home and peace of mind. I'll also add that the numerous systems perform perfectly, and that John, and his team - Wendy, and Gerard – are all a pleasure to deal with.

Sincerely,



Bob Fitzmaurice

Pictures and Descriptions

Old HVAC Systems in Basement

Oil Tanks/Piping



Sediment collected at the bottom of the dip in the oil line preventing oil from evenly draining from both tanks. The oil filter was installed, wrongly, just before the burner.

Boiler and Air Handler

The 1st Floor Air Handler (right). The home was heated and cooled by 2 "hydro-air" systems: hot water heating and air conditioning evaporator coils were installed in the supply plenum on the air handlers. Both systems included an electrostatic air filter and a bypass-type humidifier, none of which functioned properly.



Each heating zone was controlled by a thermostat and zone valve. One circulator proved insufficient to supply hot boiler water to all zones simultaneously.

Heat Recovery Ventilator



The HRV never functioned properly due to incorrect duct design and installation.

Humidifier and Electrostatic Air Cleaner



Humidifier (left) and electrostatic air filter.

Water Heater



Not-energized electric water heater used as a storage tank, with plate-type heat exchanger (top right of center).

Insufficiently-Heated Basement Space



The only finished room in the basement was inadequately heated and cooled and two factors were responsible: high infiltration and supply/return air came from the near-depleted end-of-the-duct system.

New Systems in Basement

Oil Line and Smoke-pipe



The dip in the oil line was eliminated, and a highly effective oil filter (Westwood F100) was installed on the outlet of the two-tank oil supply manifold. The 9" 24 gauge smokepipe connects to a 32-foot Z-Flex stainless steel chimney liner (see page 13). A new cleanout door was installed.

Equipment



Once the cellar space was deconstructed and made a-new, I had the opportunity to do my best work. Viewing from 6-o'clock, clockwise – the equipment: oil tanks; twin Buderus boilers; Santa Fe dehumidifier; Carrier HRV; Carrier air handler.

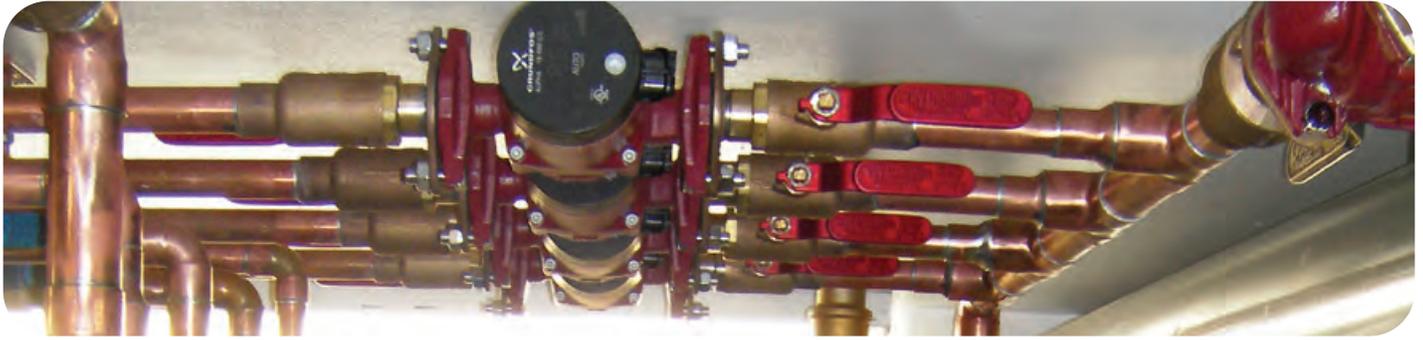
Boilers and "Local" Piping



My document holder and valve handle inventions can be seen on the boiler and local piping. The Buderus cast iron boilers are oil-fired G215/3 models, and are controlled by a Tekmar staging/temperature modulation control.



My valve handle, flange and tee designs are incorporated in the Supply/Return, expansion tank, and system make-up water piping.



Grundfos Alpha circulators were chosen to maximize performance with the lowest electricity consumption.



My patent-pending components add function *and* form to the systems.



Zoning demystified.

Additional Equipment in Mechanical Room

Indirect-Fired Water Heater



Triangle Tube lifetime-warranty, stainless steel indirect-fired water heater (left). My lead-free bronze circulator flanges connect to the Grundfos circulator for hot water re-circulation. Potable water connections (right) are on top, and boiler water connections (not shown) are in the back of the tank-within-a-tank.

Dehumidifier



Santa Fe dehumidifier controls humidity in the entire basement.

Heat Recovery Ventilator



Carrier Heat Recovery Ventilator (HRV) ties into the 1st floor A/H duct system and provides fresh air supply/stale air exhaust.

1st Floor Hydro-Air Heating & Cooling System



Carrier 5-ton Air Handler (A/H) – Valves on refrigerant lines; HEPA/electronic air filter; UV lights and WIFI-connected system control add effectiveness and utility to the hydro-air system. I designed all custom-fabricated ducts to minimize static pressure and maximize airflow efficiency and distribution effectiveness.



Painting ductwork added 16 hours of labor cost and \$200, plus or minus, of other direct/variable costs. The white diffuser (right image) delivers fresh air to the mechanical room. The same fresh air supply feeds the return plenum of the A/H.

Additional 1st Floor Hydro-Air System in Basement



This 2-½ ton A/H was added to heat and cool a remote area of the 1st floor that always struggled to be heated and cooled satisfactorily. This system includes a bypass humidifier, dual UltraViolet lights and a combination electronic/High-Efficiency Particulate Air (HEPA) filter. My bronze plaque design (top right) and aluminum document holder (right side of A/H) add contact information and utility to the system.

Old Systems in Attic



This was the 2nd Lennox A/H in the home (in the attic) that served the 2nd floor. Loose plywood made for perilous walking!



All of the “run-outs” in the attic were flex duct, and were kinked and excessively long. Consequently, many of the rooms below were starved for sufficient airflow. The flex ducts were installed so haphazardly that most were crushed over time by people stepping on them.

New Systems in Attic



This replaced the prior pile of flex duct.



The supply trunk on the right replaced 3 excessively long flex run-outs.



Carrier 5-ton A/H with same options as 1st floor systems.



The space is now accessible without stepping on ducts, or mis-stepping on unfastened plywood, through the insulation and sheetrock ceiling below.



Valves on refrigerant lines and unions on condensate drains facilitate future maintenance.

Dehumidifier



Closed-cell foam insulation (sprayed directly onto the underside of the roof) acts as a vapor barrier. Therefore, a dehumidifier was required to manage relative humidity in the attic, via a hard-wired de-humidistat.

Exhaust Fans – 1st Floor Baths



Two 600-CFM exhaust fans (identical to the master bath) for 1st floor baths were installed and vented through rim joists.

Whole-house Fan



A 900-CFM attic exhaust fan was installed and vented through the roof (see page 13)– this acts as a whole-house fan and removes insulation “out-gas” odors from the attic.

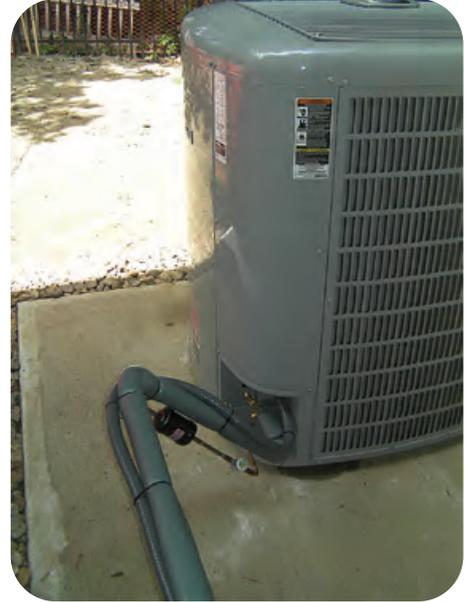
Master Bath Exhaust



This 600 CFM fan removes air from 2 locations in the master bath and exhausts through the roof (see page 13).

Outdoors

A/C Condensing Units



Two-speed Carrier condensing units match A/Hs to produce the highest SEER (efficiency) rating. A concrete pad was poured specifically for them. Pipe insulation was painted to shield it from degrading UV rays.

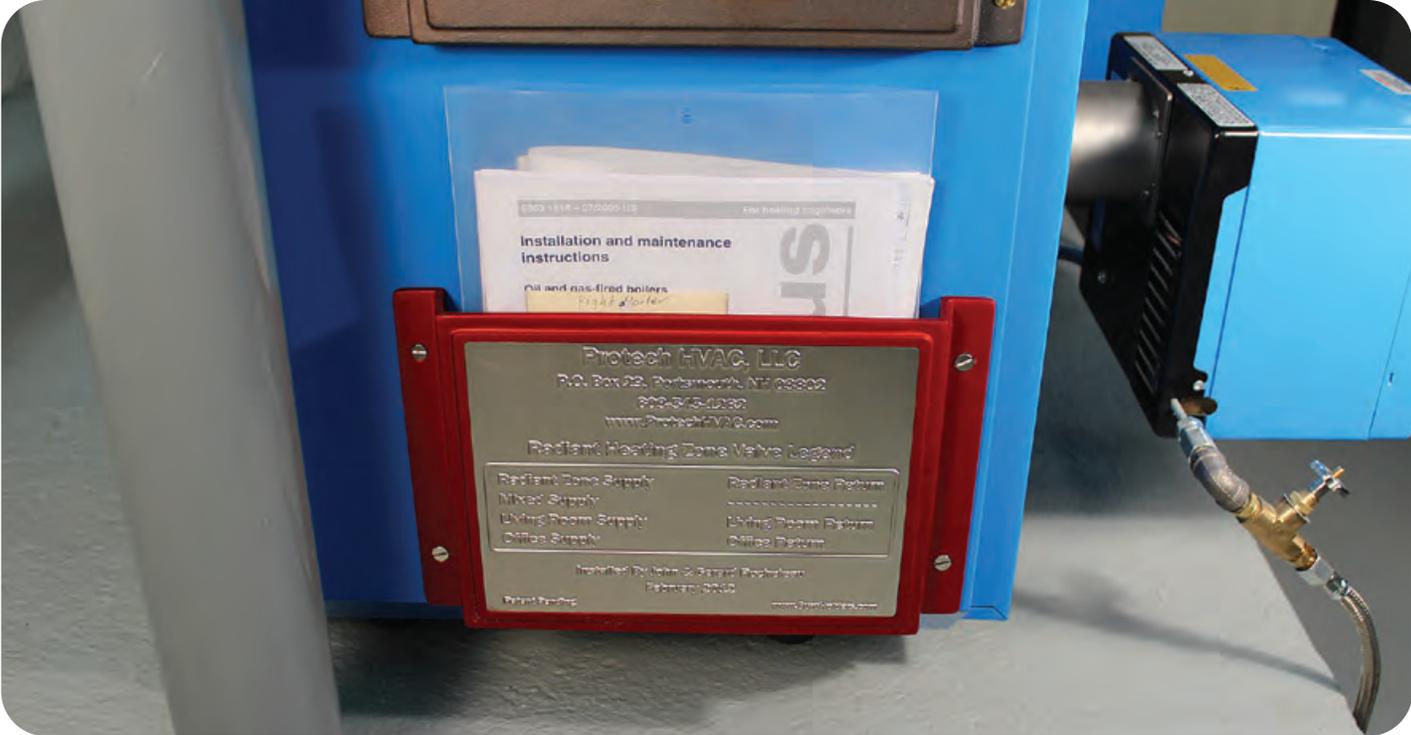
On the Roof



From top left, clockwise: 32-foot stainless steel Z-Flex chimney liner passes up through existing chimney; close-up of termination; whole house fan vent and master bath exhaust vent.

John's Made-in-America Products – Patents Pending

Document Holders

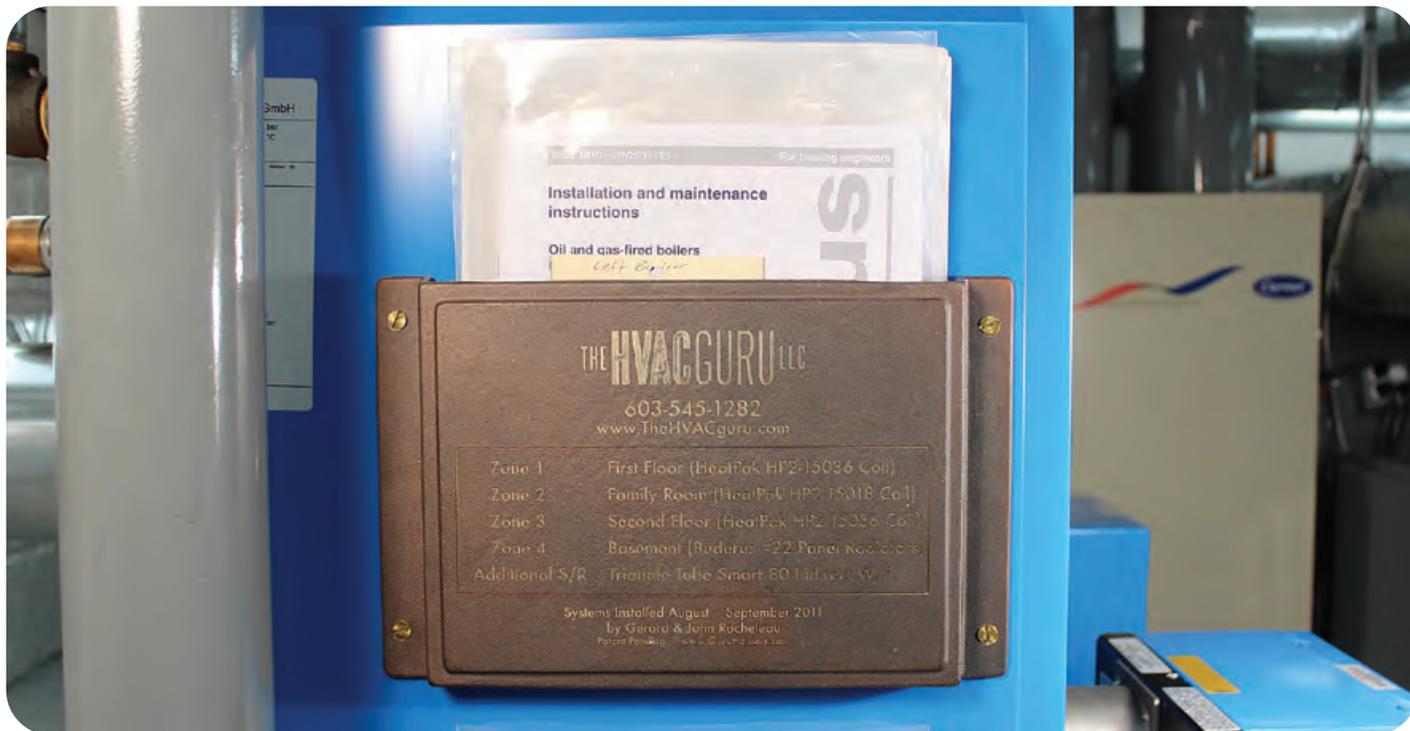


Anodized aluminum document holder with customized zone legend provides organization of all technical sheets and manuals, and aids in zone piping identification.



Document holder zone legend plate with corresponding valve handle plates are coordinated to resolve any would-be mystery with zone piping. Epoxy holds the plates in place.

In all, 54 product-units of my own design were installed on 5 systems – forced hot water heating system; 3 air handlers; and 1 water heater. Only the copper pipe and fittings manufacturer had more product-units.



As-cast bronze document holder with machined text zone legend.

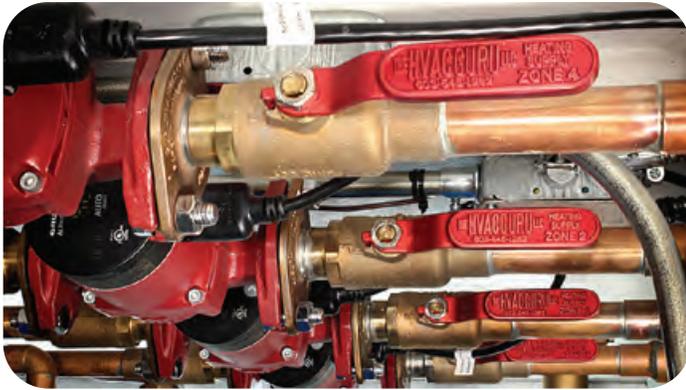


Anodized (as paint primer) and painted aluminum document holder – no zone legend is needed on the 3 single-zone A/Hs. My bronze company plaque can be seen just right of the Carrier logo (center image).

Valve Handles



Anodized Aluminum Holders – Cast Text



Red and blue anodized aluminum handles intuitively differentiate supply (hot) from return (cold) pipes.

Anodized Aluminum Handles – Nickel-plated Text (Inserts)



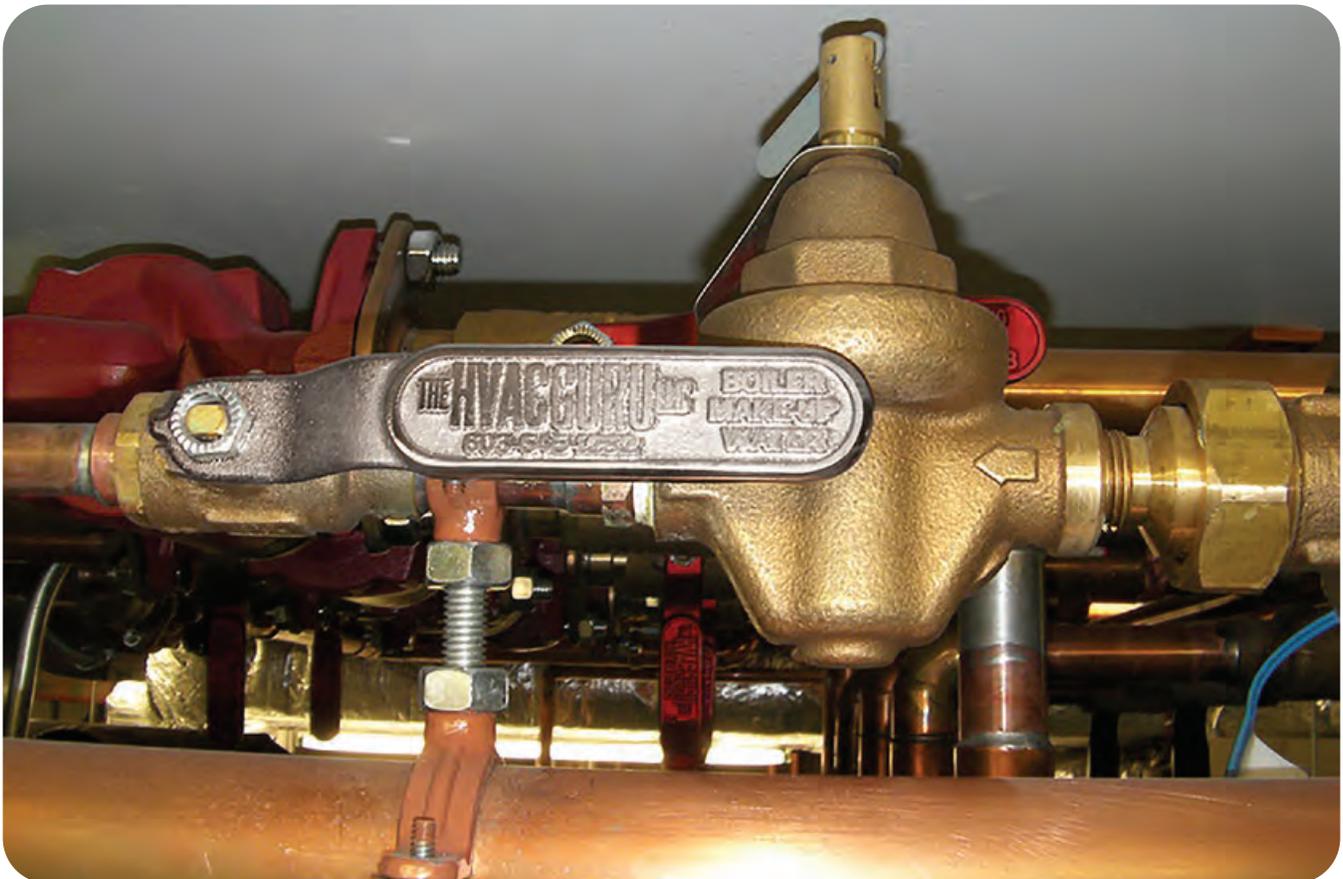
Nickel-plated handle inserts were customized to remove all mystery from the aspect of the heating system the valves (and pipes) serve. These plate inserts are pressed into place after the handles are installed, ensuring that the text is always upright regardless of valve installation direction.

Lacquered Bronze Handles

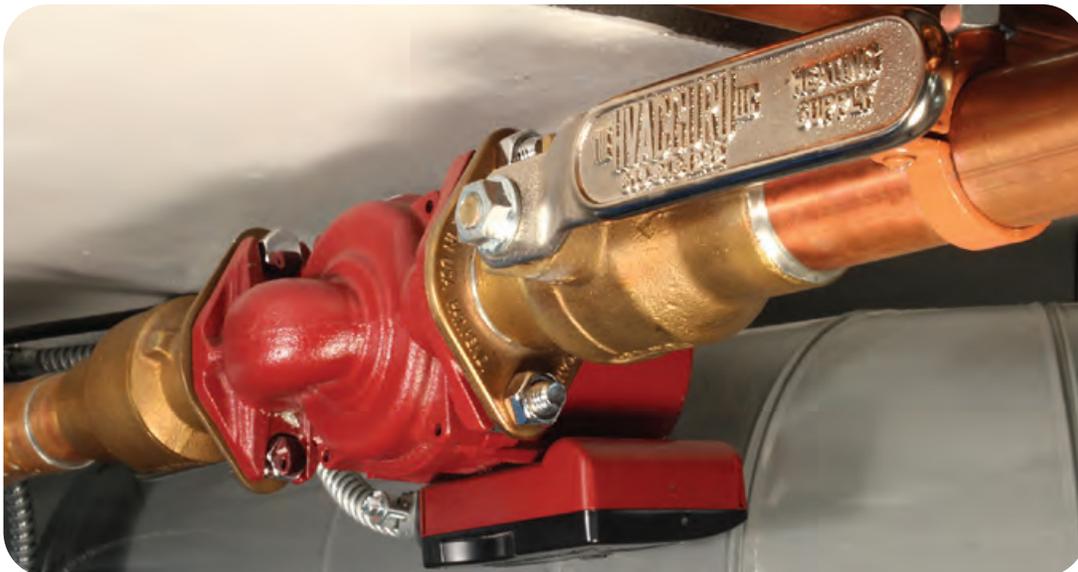


Lacquered bronze handles designate "Heating Supply" and "Heating Return" lines to the hot water coil associated with the attic A/H.

Nickel-plated Valve Handles



Nickel-plated bronze "Boiler Make-Up Water" valve handle on 1/2" Apollo ball valve.



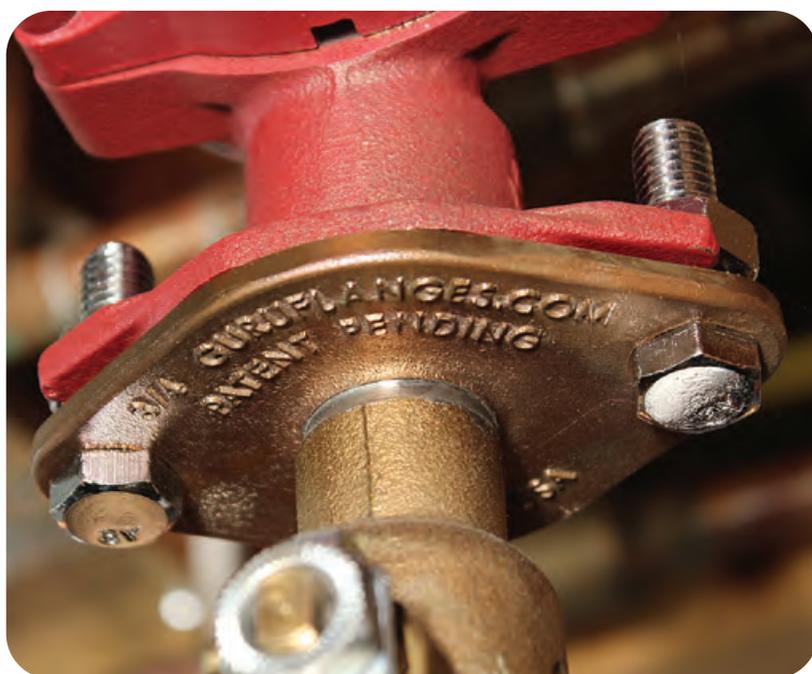
Nickel-plated bronze "Heating Supply" handles on 1-½" valves that isolate the supply line to the Triangle Tube indirect-fired water heater.

Circulator Flanges

The best modern circulator flange: lead-free, low-mass bronze "street" sweat. Solders to a valve or fitting without a section of pipe.



95% Copper Street Flange



Lead-free flange on the potable hot water "re-circulator" associated with the Triangle Tube (Smart) water heater.



Bronze ITS-Flanges clean up nicely with a wire wheel and complimentary stainless steel, or chrome-plated, nuts and bolts add form and corrosion resistance. Solder flows evenly around the circumference of the flange for a perfect seal.

It's Only a



A Tradesman's Story of
Inventing the Taco, Inc.
freedom **FLANGES** and Valves.



"Purge" Tee

Lead-free 95% Copper Street Tee



Tee is behind the nickel-plated, polished/buffed bronze 1-1/2" valve handle, and has a purge valve (yellow handle) attached.



Like my bronze flanges, the 1-1/2" Male (Street) X 1-1/2" Female X 1/2" IPS lead-free, bronze sweat (solderable) Tee eliminates the need for a length of copper pipe to join it to a valve or fitting.

The End

John Rocheleau specializes in analysis & troubleshooting, design, installation and repair of challenging HVAC projects throughout New Hampshire, Maine and Northeastern Massachusetts. John also works as consultant (legal and otherwise) and expert witness throughout New England.

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