

Some Basics Of Dual Fuel & Where to Learn More Tech To Tech Column August 2008

“Make daily deposits to your box of knowledge, soon it will have many reference cards.”--Randal S. Ripley

Dual fuel or “hybrid” systems as some call them are a heat pump paired with a gas or oil fired furnace, although the most popular version is with a natural gas furnace, using the heat pump in the milder temperatures and switching over to the fossil fuel furnace when the temperature outside is cold enough to keep the heat pump from being able to satisfy the space.

Dual fuel has been around for sometime now but prior to this year the contractors that frequent the equipment distributorship that I work for had little interest in them.

The force that is driving this, especially the more popular natural gas furnace version, is the relatively cheap cost of natural gas in comparison to electrical rates.

Before dual fuel, heat pumps installed in the New England region used electric heat strips as supplemental heat in most applications when the outdoor ambient temperature dipped below the units *balance point* (temperature that the heat pump can no longer maintain the space temperature, usually around 35°F).

I recently posted some information published in an article in the Union leader on my tech blog located at <http://www.totalairsupply.com/blog.aspx> comparing the cost per million BTU's of natural gas, propane, oil and electricity as of Friday May 23, 08.

- o **Electric**--\$0.16/kilowatt hour--\$45.72 per million BTU's
- o **Propane**--\$3.19/per gallon, credit--\$34.97 per million BTU's
- o **Oil**--\$4.16/gallon, cash--\$31.42 per million BTU's
- o **Natural Gas**--\$1.50/per therm, 1st tier--\$15.01 per million BTU's

As you can see the electrical rates compared to the natural gas rates here in New Hampshire, easily offset the initial higher cost of the dual fuel equipment, making the choice of going to a dual fuel system an easy one compared to running electric heat strips. *Some utilities offer rebates for installing heat pumps and electric heat strips, contact your utility for more information on rates for your area.*

Some Basics of How They Work:

The dual fuel systems I am familiar with use an All Fuel System Control Board or Dual Fuel Kit depending on which brand you are talking about that resemble a zone control board to switch the system from one source to the other.

As with a standard single stage heat pump Y & G are energized to bring on the first stage of heat and the fan. We want the heat portion to work even if the reversing valve fails (think winter situation here), so a call on the Y terminal calls for heat. All new systems also send a signal to the Y on the defrost board to so it can accumulate compressor run time and trigger the defrost cycles.

As with a standard single stage heat pump Y, O & G are energized to bring on the first stage of cooling and the fan. The O terminal activates the reversing valve of the system to put the heat pump into cooling mode.

As you can see the Y always initiates either first stage call for heating or cooling.

When the Y is calling but not satisfying the space, the Dual fuel control will initiate a call for the second stage of heating, turning the heat pump off and turning the furnace on.

Some systems use an outdoor thermostat that can be set to shut the heat pump down at a given outdoor ambient temperature; bringing the furnace on and avoiding any swings in temperature before the unit switches over.

The old standard heat pump systems created many customer complaints in the defrost mode of cold air blowing from the vents because the system is in the air conditioning mode while defrosting.

The dual fuel board still puts the system into air conditioning mode when going into defrost and turns off the outdoor unit fan but it also turns on the furnace allowing the indoor coil to absorb some of this heat to send outside for defrost purposes while sending the remainder into the space to prevent cool drafts & customer complaints.

Note: this is the only time the furnace and heat pump will run at the same time.

Final Comments and Where to Learn Much More:

I realize this is a very simplistic overview of dual fuel systems but every brand has its way of wiring and controlling the systems and then you have some manufacturers that are making thermostats that act as the Dual Fuel control. I could easily fill 20 pages of information here and not even scratch the surface of what you would like to know but instead I came up with a better idea (at least in my mind anyway).

What I have done is provide you with a link to a group of documents with links to the instruction manuals that fully explain with words, pictures & diagrams some different dual fuel controls, an outdoor thermostat, how to connect them with heat pump systems and how to connect all of this to EWC zone control boards. You may just be impressed with the diagrams you will find on the EWC site.

Obviously the manuals are specific to brands my employer sells (I not interested in standing in the unemployment line) but there is still a lot of good information to be gleaned here for anyone interested in learning more about dual fuel systems. **For Additional Dual fuel information click on the link:** <http://www.totalairsupply.com/library.aspx>

Please check out my tech blog and send in your comments. I certainly would like to see what others in the industry are thinking.
<http://www.totalairsupply.com/blog.aspx>