Operational Comparison of the BULLDOG Heat Pump and Reversing Heat Pump

What are the mechanical operational differences between a BULLDOG Heat Pump and a Reversing Water Source Heat Pump (WSHP)?

- In the cooling mode, both systems operate the refrigeration components as water-cooled AC units.
- In the heating mode, a Reversing WSHP uses the refrigeration system (compressor - evaporator – condenser) in order to absorb heat from the fluid loop.
- The BULLDOG System uses a simple hydronic coil to absorb heat from the fluid loop in the heating mode.

Do the building systems have the same components?

Yes. There are boilers, pumps and cooling towers for either system.

What internal components are different in the units?

- A WSHP has a Reversing Valve while the BULLDOG unit does not.
- A BULLDOG unit has a hydronic coil, while a reversing WSHP does not.
- A BULLDOG unit has highly effective condenser.

Do the two systems operate differently?

Both system can either heat or cool any space simultaneously at any time of the year.

The BULLDOG system will make use of warmer loop temperatures in the winter heating season since it operates as a simple fan coil. In the spring, fall and winter, the BULLDOG system will follow a simple water temperature reset schedule based on ambient conditions just like any fan coil system. Any BULLDOG unit that is called upon to operate in the cooling mode in the winter season will be able to do so.

Where does the heat come from for either system?

The heat comes from exactly the same source for either system. Meaning, the heat comes from the fluid loop. The heat contained within the fluid loop comes from the heat of rejection of the cooling units or from the boiler plant or a combination of both or even from a geothermal field. **The heat always comes from the fluid loop.**

A WSHP system has a COP of 4 to 5. What is the COP of the BULLDOG system?

If the BULLDOG system had a COP it would be extremely high. Meaning, if we were to take into account the kW input (fan motor only) and the heat output of a fan coil we would get a very high COP (in the range of 28+). However we cannot use the term COP when referring to a fan coil. The simple fact is that a BULLDOG unit does not require compressor power input in order to absorb waste heat from the fluid loop. That does not change the fact that a fan coil can make use of waste heat from units operating in the cooling mode.

How much of the heat does the compressor deliver with a Reversing WSHP?

In doing work the compressors generate extra heat (called heat of compression) and it ends up in the air stream as useful heat. Approximately 25% of the total delivered heat comes from the compressor. Therefore, 25% of the heat delivered with a WSHP is electric heat.

How much heat does the BULLDOG system deliver from the compressor?

None (the compressors are not required for the heating mode).

If the BULLDOG system does not provide any heat from the compressors, how does it make up that portion of the heat that comes from electricity with a WSHP?

The BULLDOG system will make up the 25% heat from the building's heat source, which is where 75% of the heat originates from with a WSHP.

Is it better to heat with electricity or with Natural Gas?

Electrical compressor heat will typically cost 3 to 5 times **more** than heat obtained from Natural Gas boilers.

Is it more advantageous to absorb heat from the fluid loop with a BULLDOG unit or with a compressor unit?

There are too many advantages with the BULLDOG system to list here. Please refer to the Financial Benefit pamphlet for a complete list of advantages.

	REVERSING WSHP	BULLDOG Heat Pumps
Boiler – cooling tower- pumps	YES	YES
Reversing Valves	YES	NO
Heat from electricity	YES	NO
Uses compressors in cooling	YES	YES
Uses compressor in heating	YES	NO
Makes use of waste heat	YES	YES
Capable of simultaneously heating and cooling anytime	YES	YES
Places heating components on same loop as heat pumps	NO	YES
Places Make Up Air unit on the same loop as the heat pumps	With limitations	YES