

Common Air Source Heat Pump (ASHP) Questions

What is the recommended sizing for emergency heat?

Manual S - ACCAs Sizing and Selection manual recommends sizing Emergency Heat for 90 to 110% of the full heating load. This would be different than how we stage supplemental (aka back up or aux) heat, which we'd set the stage to cover the delta between what the HP can do and what is needed. 75-100% is also an acceptable sizing range for Emergency Heat.

Would sizing supplemental heat for full heating load cause spacing or up-front cost?

It can, but functionality such as fixed size vs. stageable vs. variable capacity strip heat will be a much larger contributor to first cost. The biggest consideration is control strategy and cost of use.

What is the most accurate way to calculate the most efficient way (economically) to switch over HP to gas heat? Any formulas? I can find out gas/electricity price, but how do I know how many units will each use at same ODT?

It will depend on several things such as utility rates, equipment efficiency, and size. In Northern Illinois, we recommend visiting GoElectric.ComEd.com. In the 'For Customers' section there is a Savings Calculator that can help you make this determination. There is also a Switchover Guide in the 'For Contractors' section of that same website that covers this topic in depth and aligns with breakeven coefficient of performance BeCOP and comparison to manufacturer data or other listed data.

When and why should switchover temperature be changed after originally set?

It will depend on which balance point is used for the configuration:

- When the economic balance point is used for switchover, the changing utility rates especially electric rates and fossil fuel rates will need to be considered often and will impact or change the economic balance point with every rate change. For contractors, determining the best switchover temperature based on homeowner experience and current rates as a part of your annual maintenance/service package is a great way to deliver true consulting prowess to your customers and to keep systems operating cost competitively.
- When the thermal or capacity balance point is used for switchover, the balance point will remain constant unless there are improvements or deterioration of the homes

structure and insulation values. This switchover temperature will need to be changed when improvements are made that would affect the home's heat retention such as adding insulation or replacing windows and doors.

- When the comfort balance point is used for switchover, the occupancy of the home is the biggest motivator to change the switchover as well as life events that may affect comfort. When a home is sold to new owners they will have a different comfort balance point or may have different motivations for changing the switchover temperature such as carbon emissions reduction.

Will a heat pump outdoor unit have the same life expectancy as a standard a/c compressor? I ask because of how much more run time for a heat pump outdoor unit vs a/c only.

The life expectancy will typically reflect the hours of operation, the installation quality, manufacturer, etc.. Heat pumps will run more often than AC units, but quality manufacturers test the systems and components to ensure a 15-20 year life for the majority of the equipment.

Does homeowner electric cost go up significantly if compressor/HP unit is running almost year-round or does the gas savings offset this typically?

For dual-fuel or hybrid systems, it depends greatly on the selected switchover temperature. If an economic balance point is used, typically homeowners will save money over the course of the year. If however, the switchover temperature is set below the economic balance point, depending on the equipment, it may cost the homeowner more to heat with a heat pump.

Should the outdoor coil be cleaned twice a year? After Winter and after Summer?

It is recommended that the outdoor unit be cleared of debris, snow, etc. two or three times a year. Professional cleaning and maintenance should be determined between the homeowner and contractor and follow manufacturer guidance. Typically with a full maintenance contract, a homeowner can expect the outdoor unit to be fully cleaned every year or every other year.

Is there a limit on how high a heat pump can heat a house? I have some older customers that like it at close to 80 degrees, can a heat pump achieve that?

- No, the limitations would be based on the size of the home and the heating load, the size and capabilities of the equipment, and the control strategies.
- Using a heating set point over 72°F however will be asking the system to do more than typical design conditions. Systems sized to provide enough heat to reach a high set point are commonly going to be oversized for the "shoulder seasons" – aka Spring and

Fall and experience low load short cycling. This can impact efficiency, savings, dehumidification, noise, and potentially even shorten the life of the equipment.

What percentage of the outdoor unit can be covered by snow drifts before it loses capacity?

After about 10% blockage, the airflow over the outdoor coil begins to become compromised. This can happen with frost, which engages a defrost cycle, but can also happen with leaves/debris and snow. Keeping systems on a stand that extends at least six inches above the local snow line is the minimum for good installation practices.

When sizing an air source heat pump, how important is the ductwork and how important is the ability to remove moisture from the air?

In Northern Illinois, we have both a cold climate during the winter and a humid climate in late Spring through early Fall. Due to this, the following three critical factors must be followed to size an ASHP correctly:

- Size for the heating and cooling loads. This is an assessment of the home's heating and cooling needs and is based on the home's age, location, insulation and air sealing levels, and location of the system and ductwork.
- Size for the ductwork. A duct assessment to ensure the airflow needs of a new heat pump can work with the existing ducts. Be sure to keep in mind that most furnaces require 150 CFM per 10,000 BTU's and heat pumps require 350 CFM per 12,000 btu's. Most HVAC systems were initially installed by the lowest bidder and "extra" ductwork is uncommon.
- Select equipment that has the capabilities to deliver the heating and cooling loads, does not have a lot of low-load short cycling (see the NEEP Adv Sizing Tool and avoid more than 30% low-load cycling for both heating and cooling), as well as the sensible heat fraction (CSHR of the equipment) at or lower than the Sensible heat ratio of the home (JSHR from the load calc) in order to dehumidify the home.