

F280-12 INTERPRETATION & APPLICATION:

Tips for Building Professionals.

This document provides tips to help contractors and builders apply heat-loss principles when evaluating, selecting, and designing heat pump systems.

Tip #1 – Discuss Opportunities to Improve Heat Loss

- **An F280-12 load calculation provides value beyond equipment sizing.** Prior to a heat pump retrofit, a “building envelope first” approach can reduce design heat loss and may reduce the size of the heat pump. Conventional upgrades such as insulation improvements in the attics or crawlspaces are good starting points.
- Infiltration can significantly impact design heat loss. Draft proofing, using tools like a blower door and/or thermal imaging, improves the building envelope, enhances home comfort, and may reduce the heat pump size.

Tip #2 – Understand Your Heat Pump Options

- **Heat pumps are available as all-electric or dual fuel (hybrid) systems.** Appropriate equipment selection depends on homeowner preference, building performance, home location, ductwork capacity and other factors.

ALL-ELECTRIC HEAT PUMP	DUAL FUEL (HYBRID) HEAT PUMP
Solution combines outdoor heat pump, indoor air handler, and electric resistance (for supplemental heating when needed). 	Solution combines outdoor heat pump, indoor A-coil, and gas furnace. 

- **There is no one-solution-fits-all with heat pumps.** System configurations vary based on whole-home or partial-home heating and cooling objectives.
 - Whole-home solutions: centrally ducted for forced air systems, air-to-water heat pump paired with a fan coil for cooling for hydronic systems and ductless heat pumps.
 - Partial-home solutions: ductless heat pumps.
- **Calculate the capacity balance point when evaluating options.** Heat pump performance varies by make and model and understanding balance point is critical for determining supplemental heating strategies. All-electric solutions may rely on electric resistance in cold conditions, while dual fuel (hybrid) heating systems switch over to a gas furnace.

Tip #3 – Verify Equipment Performance

- **All heat pumps are not created equal.** When comparing options, review key performance metrics:

Heating Seasonal Performance Factor (HSPF 2):	Seasonal Energy Efficiency Ration (SEER 2):	Coefficient of Performance (COP):
Ratio of how much energy the heat pump delivers to the building over the full heating season (in BTU), to the total energy (in Watt-Hours) it uses over the same period. A high-efficiency heat pump will range from HSPF 2 of 8.5 – 10.0.	Measures the cooling efficiency of the heat pump over the entire cooling season. A high-efficiency heat pump will range from SEER 2 of 15.2 – 17.0.	An expression of the efficiency of a heat pump at a given outdoor condition. COP is the relationship between kilowatts of input versus kilowatts of output. A simple electric resistance heater has a COP of 1.0 (1 kW of energy produces 1 kW of heat), whereas the COPs of heat pumps can range anywhere up 3.5 or better.

- **Don't forget about cold climate performance.** Cold climate rated heat pumps are designed maintain higher capacity and efficiency at low outdoor temperatures and can operate down to -25°C or colder.

Resources available to contractors to compare technologies include:

- Natural Resources Canada's [Air-Source Heat Pump Sizing and Selection App](#): Allows users to compare different heat pump options via performance, emissions, and operating costs in both new-build and existing home applications.
- [Air-Conditioning, Heating, and Refrigeration Institute \(AHRI\)](#): Provides a directory of third-party certified product performance data.
- [Northeast Energy Efficiency Partnership \(NEEP\)](#): Provides a directory of heat pumps particularly focused on cold climate performance.

Tip #4 – Use HVAC Design to Optimize Performance

- **New homes: room-by-room loads via F280-12 in new construction allows you to design an optimized system for a high-performance home.** The required design heat loss and heat gain information can be used to size and design the system to integrate with structural and aesthetics, blending home functionality and performance.
- **Existing homes: the importance of good HVAC design should not be overlooked.** Ductwork enhancements (e.g., adding supply/return air, improving ductwork transitions, duct sealing) can address static pressure issues, improve ductwork capacity, and enhance overall system performance (e.g., comfort, noise, and energy-efficiency) and customer satisfaction.