



Course: Electrical
Section: HVAC Technician



James Rumsey
Technical Institute

How a Heat Pump Moves Heat

What You Will Do

See how compression and expansion can transfer heat to and from an object like a heat pump.

Materials You Will Need

- A thick rubber band

What is a Heat Pump?

A furnace creates heat by burning fuel or using electric resistance. A heat pump moves existing heat, which often uses less energy. A heat pump uses electricity and refrigerant to transfer heat:

Winter: Moves heat from outside into the house

Summer: Moves heat from inside the house to outside

Even cold outdoor air contains some heat energy.

How Does Refrigerant Transfer Heat?

Refrigerant is a gas that is compressed to a liquid. It transfers heat by continuously circulating through a closed system, changing from liquid to gas and back again to absorb and release energy. It absorbs heat from an indoor space by evaporating into a gas. Then it goes to a condenser, where it releases the heat and condenses back to a liquid, driven by a pump called a compressor.

Heat Pump Simulation

1. **Compression** – Quickly stretch a thick rubber band and touch it to your lips or forehead to feel the heat.
2. **Heat transfer** – Hold the stretched rubber band for a minute. The heat generated by changing the rubber band's state (stretching it) is being transferred to the cooler air around it.
3. **Expansion** – Let it relax, and touch it again to feel how much cooler it is than when you started.

This demonstrates how compressing and expanding a material changes its temperature, which is the foundational principle of a heat pump.