

Building Science Glossary

ACH – Air changes per hour.

Air Barrier - A continuous surface designed to block the flow of air.

Air Change - The replacement of a quantity of air in a space within a given period of time, typically expressed as air changes per hour. If a building has one air change per hour, this is equivalent to all of the air in the building being replaced in a one-hour period.

Air-Source Heat Pump - A type of heat pump that transfers heat from outdoor air to indoor air during the heating season, and works in reverse during the cooling season.

Btu (British Thermal Unit) - The standard measure of heat energy. It takes one Btu to raise the temperature of one pound of water by one degree Fahrenheit at sea level. For example, it takes about 2,000 Btus to make a pot of coffee. One Btu is equivalent to 252 calories, 778 foot-pounds, 1055 joules, and 0.293 watt-hours. Note: In the abbreviation, only the B is capitalized.

Band Joist - vertical member that forms the perimeter of a floor system in which the floor joists tie in. Also known as the rim joist.

Balloon Framing - An older style of framing in which the studs in the bearing walls are run uninterrupted from the sole plate up to the roof plate. The floor joists are nailed to the studs. This style of framing is no longer allowed, in large part because the open stud cavities allow a fire that starts in the basement or first floor to travel rapidly to the upper floor and attic.

Batt - precut length of insulation to fit typical wall cavity heights and widths. Batts are designed to use in wall cavities, attics, floors, standard wood framing, and standard wood joists-vaulted ceiling cavities (cathedral ceilings). They save you time in installation and can be friction-fit installed between studs.

Blower Door Test - Blower doors are designed to measure how airtight (or leaky) a home is, normally using the parameter of air changes per hour (ach). These tests can be used to diagnose comfort, indoor air quality, and durability problems.

Building envelope - The building envelope includes everything that separates the interior of a building from the outdoor environment, including the windows, walls, foundation, basement slab, ceiling, roof, and insulation. It controls the transfer of energy (heat) between the inside and the outside.

CFM (Cubic feet per minute) - A rate of air flow.

Cathedral Ceiling/Roof - A type of ceiling and roof assembly that has no attic.

Cellulose Insulation - A type of insulation composed of waste newspaper. This material is fire retardant and also repels rodents, insects, and mold.

COP (Coefficient of Performance) - A ratio calculated by dividing the total heating capacity provided by the heat pump, including circulating fan heat but excluding supplementary resistance heat (Btus per hour), by the total electrical input (watts) x 3.412.

Conditioned Space - The interior space of a building that is heated or cooled.

Conduction - The transfer of heat energy between objects that are in contact (touching a hot iron is one form of conduction)

Convection - A mechanism for heat transfer in gases and liquids; it requires air or liquid movement to transfer heat (a hair dryer moves heat this way)

EER (Energy Efficiency Ratio) - A ratio calculated by dividing the cooling capacity in Btus per hour (Btu/h) by the power input in watts at a given set of rating conditions, expressed in Btu/h per watt.

Geothermal Heat Pumps - These ground-source heat pumps use the natural heat storage capacity of the earth or ground water to provide energy efficient heating and cooling. GHPs should not be confused with air-source heat pumps that rely on outside air. They use the relatively constant temperature of the ground or water several feet below the earth's surface as source of heating and cooling. GHPs can also provide domestic hot water

HSPF (Heating Seasonal Performance Factor) - The total heating output of a heat pump during its normal annual usage period for heating divided by the total electric power input in watt-hours during the same period.

Heat flow - Heat moves from areas of higher temperature to areas of lower temperature. When heating, your home's warm air is escaping to the outside, and while cooling the opposite is happening. Insulation is designed to resist heat flow, so the higher the R-value (R-value is the resistance to heat flow: the higher the number, the better an insulation material is able to slow heat flow), the slower heat will move into or out of a home.

Heat Gain - An increase in the amount of heat contained in a space, resulting from direct solar radiation, heat flow through walls, windows, roof, and other building surfaces, and the heat given off by people, lights, equipment, and other sources.

Heat Loss - A decrease in the amount of heat contained in a space, resulting from heat flow through walls, windows, and other building surfaces, and from exfiltration of warm air.

HVAC (Heating, Ventilating, and Air Conditioning System) - A system that provides heating, ventilating, and/or cooling within or associated with a building.

Housewrap - Any of several spun-fiber polyolefin rolled sheet goods for wrapping the exterior of the building enclosure. Touted as an air barrier that can "breathe" with respect to water in the vapor phase but repel water in the liquid state.

Infiltration - The uncontrolled inward leakage of air through cracks and gaps in the building envelope, especially around windows and doors.

Knee Wall - A short wall used to support roof rafters or to finish off an attic. The term also refers to walls that back up to unconditioned spaces like attics or garages (also called side walls).

Low-E - Most often used in reference to a coating for high-performance windows, the "e" stands for emissivity or re-radiated heat flow. The thin metallic oxide coating increases the U-value of the window by reducing heat flow from a warm(er) air space to a cold(er) glazing surface. The best location for the coating is based on whether the primary heat flow you want to control is from the inside out (heating climates) or the outside in (cooling climates).

Mechanical Ventilation - Controlled, purposeful introduction of outside "fresh" air to the conditioned space. Energy & Environmental Building Association (EEBA) criteria call for a minimum base rate of 20 CFM per master bedroom and 10 CFM for each additional bedroom when the building is occupied (and spot ventilation for kitchen and baths)

Pascal (Pa) - A metric unit of pressure. 50 Pascals is about one pound per square foot. 250 Pascals is about one inch of water column.

Pressures - Pressure moves from areas of high pressure to areas of low pressure. Pressure and holes are one of the biggest concerns in residential construction, and they are tied into much of what we need to understand about how our homes function.

Pressures can be caused by external conditions (wind and temperature), internal conditions (exhaust fans, air handlers, chimneys and vents, and clothes dryers). In order for pressures to influence how a house performs, there needs to be either an intentional or unintentional hole associated with pressure.

If you feel cold air entering your house, this is a result of both a hole and pressure. If you take either of these away, the hole or the pressure, the air will not move.

An important point to remember is that cold air entering your home may be replacing warm air leaving your home. In other words, we tend not to notice air leaking out of our home as much as air leaking into our homes, although they can be equal amounts. Air leaking out can generate problems with attic and wall condensation in cold climates and ice dams in climates with heavier snow loads.

R-Value - A unit of thermal resistance used for comparing insulating values of different materials. The higher the R-Value of a material, the greater its insulating properties and the slower the heat flows through it.

SEER (Seasonal Energy Efficiency Ratio) - SEER is a measure of cooling efficiency for air conditioning products. The higher the SEER rating number, the more energy efficient the unit is.

Sheathing - The structural covering, usually wood boards, plywood or foam board, used over studs or rafters of a structure.

Side Wall – See *Knee Wall*.

Sill Plate - The horizontal framing member at the base of a wood-framed house. Attached to the foundation with anchor bolts set into the foundation. A layer of foam sill seal material insulates between the sill plate and the foundation.

Sizing - Refers to the procedure a heating contractor goes through to determine how large a furnace (measured in Btu) is needed to heat a house efficiently. Too small a furnace won't deliver enough heating; too large a furnace increases energy costs and can have an adverse effect on comfort. Sizing depends on the square-footage of the home, the amount of ceiling and wall insulation, the window area, use of storm doors, storm windows, and more.

Soffit -The roof area that extends beyond the building walls.

Soffit Chute - A device attached to the underside of the roof sheeting that allows air to pass through the soffit vent into the attic without disturbing the insulation at the edge of the roof.

U-Factor - A quantitative measure of heat flow or conductivity, the reciprocal of R-value. While building scientists will use R-values for measures of the resistance to heat flow for individual building materials, U-factor is always used as a summary measure for the conductive energy measure of building enclosures.

Vapor Barrier - A material that severely limits the movement of water vapor (water in a gaseous state) from one side of the material to the other.

Vaulted Ceiling - Arched, pitched or concave (barrel-shaped) ceiling design often incorporated to enhance the spaciousness of a room.